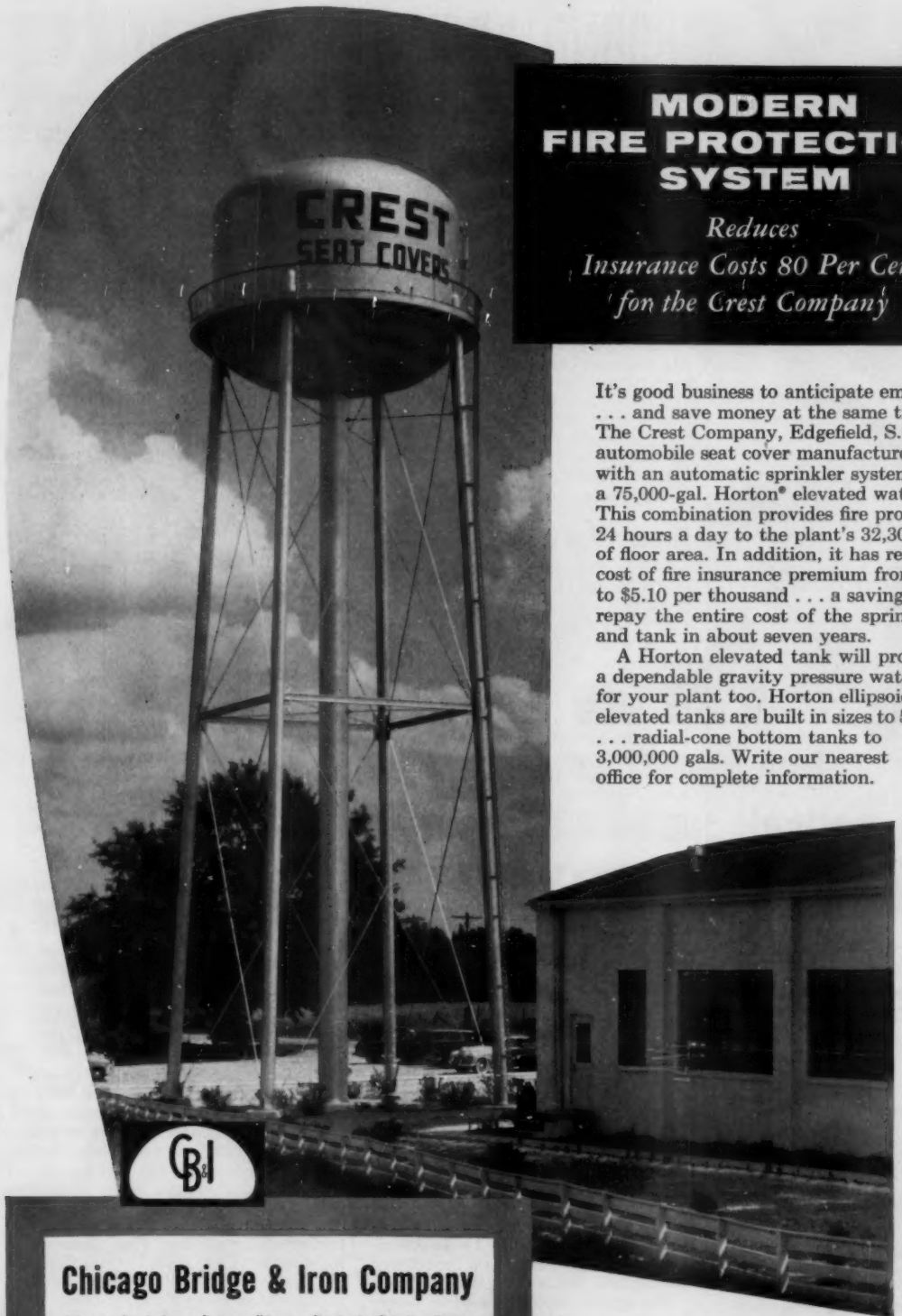

MODERN FIRE PROTECTION SYSTEM

Reduces Insurance Costs 80 Per Cent for the Crest Company

It's good business to anticipate emergencies . . . and save money at the same time. The Crest Company, Edgefield, S.C., automobile seat cover manufacturers, did it with an automatic sprinkler system and a 75,000-gal. Horton® elevated water tank. This combination provides fire protection 24 hours a day to the plant's 32,300 sq. ft. of floor area. In addition, it has reduced the cost of fire insurance premium from $25.50 to $5.10 per thousand . . . a savings that will repay the entire cost of the sprinkler system and tank in about seven years.

A Horton elevated tank will provide a dependable gravity pressure water supply for your plant too. Horton ellipsoidal-bottom elevated tanks are built in sizes to 500,000 gals. . . . radial-cone bottom tanks to 3,000,000 gals. Write our nearest office for complete information.

The 75,000-gal. Horton ellipsoidal-bottom elevated water tank shown above provides a primary water supply for the automatic sprinkler system at the Crest Company, Edgefield, S. C.

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

See You in Philadelphia

IT WON'T be long now. January 23 to 26 are the dates for the 1956 Plant Maintenance and Engineering Show. This is the one time every year when the editors of PLANT ENGINEERING get a chance to meet under one roof plant engineers from all over the country.

Our booth numbers this year are 1401 and 1402 and we would certainly like to have you stop in and visit with us, chat and relax. So, don't forget to make a note of these numbers.

If you would like to have an advance registration card for the show, kindly indicate "Registration Card" on the postage-paid card in this issue.

Digest of New Products

TO KEEP THE industrial world informed of the design and application of new products, a relatively new publication, Inventor New Product Digest collects interesting articles from various magazines and presents them in capsule form. In addition, it supplies information on a number of new products which may include items from a zipper lubricator, a pneumatic coolant supply system, a cam actuated clamp to a letter opener.

Readers interested in getting more information about this magazine should contact Eugene D. Pendergraft, Syndreco, Inc., P. O. Box 2052, Austin 11, Texas.

Construction Spending in 1956

NON-RESIDENTIAL construction spending will pace the construction field in 1956 with a gain of about 15 per cent, according to *Architectural Forum*. Total expenditures for new construction in 1956 will soar to $44.1 billion or more than $170 million a day during each Monday to Friday work week. Of this amount, industrial building will bite off $2,600 million, and over the next ten years, it should steadily advance to a level about 50 per cent higher than the 1955 estimate.

Survey on Foremen's Supervision

MANY COMPANIES expect more from their foremen than they are willing to let them do, a recent study by the American Management Association Supervisory Development Service indicates.

The survey sample included 56 manufacturing companies, seven utilities and three petroleum and food processors ranging in size from 100 to 116,000 employees.

More than 90 per cent of the respondents said their first-line supervisors were responsible for job training, answering employees' questions and meeting periodically with superiors to discuss problems.

More than four-fifths of the companies expect foremen to discipline employees, but less than half permit them to demote or discharge for cause. And in only a little over a third of the responding firms can foremen actually award merit increases. In consequence, many foremen are under pressure to get results without having the power to enforce their decisions.

Additional information about the survey results may be obtained by writing to the Director, Supervisory Development Services, American Management Association, 330 West 42nd St., New York 36, N. Y.

Morris New President of SBME

AT THE November meeting of the Society of Business Magazine Editors, **Richard H. Morris**, Editorial Director, PLANT ENGINEERING, was elected the new President.

Other new officers elected at this session were: First Vice-President, Eldridge Peterson, Editor, *Printers' Ink;* Second Vice-President, Norman C. Firth, Editor and Publishing Director, *Dun's Review and Modern Industry;* and Secretary-Treasurer, William A. Phair, Editor, *Hardware Age.*

Electrical, Corrosion Meetings

ELECTRICAL DEVELOPMENTS in various industries will be discussed at the 1956 Winter General Meeting of the American Institute of Electrical Engineers. It will be held at the Statler Hotel, New York, from January 30 through February 3. Such industries as chemical, mining and metals, petroleum, communications, land transportation and textiles will be covered in the discussions.

The Electrical Association of Rochester will sponsor an Electrical Exposition in Rochester's brand new War Memorial Building, from February 18 through the 25. The Exposition will include the latest products from every electrical field.

Means of reducing the nation's multi-billion dollar annual loss to corrosion will be stressed at the 12th Annual Corrosion

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of Address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

Pacific Telephone & Telegraph Company used

WROUGHT IRON PIPE for this Radiant Heating System

This radiant heating system, serving 22,500 square feet of floor area in Pacific Telephone & Telegraph Company's new warehouse at San Leandro, California, is an excellent example of the Company's insistence on durability. More than 16,300 feet of corrosion-resistant wrought iron pipe was used to safeguard the system against premature failure and costly repair.

The system, planned and designed by PT&T's Engineering Department, features some interesting construction details employed to protect the floor against damage from heavy fork-lift trucks and impact caused by bouncing reels of cable. After the 10-inch structural slab was poured, wrought iron pipe coils were laid in place. Over the pipe coils, a wire mesh was stretched to strengthen the concrete "topping" slab, and contribute to more even heat distribution. Then the pipe and mesh were covered with 3 inches of concrete. A metallic floor hardener was applied to the surface.

Architects for the project were Thomsen & Wilson, San Francisco. The system was designed by Harry S. Haley, San Francisco Consulting Engineer, in collaboration with Pacific Telephone & Telegraph Company engineers. The installation was made by Scott Co., Bay Area Mechanical Contractors.

Wrought iron pipe is ideally suited for this service because of its ease of installation, dependability in service. It takes short radius bends, without springback. It produces sound welds, free from pin-hole leaks. Its uniform structure assures sharp, full-depth threads. And because of its mechanical strength, wrought iron pipe withstands damage during installation. In service, wrought iron stays on the job longer, costs less per year.

Our bulletin, *Wrought Iron Pipe for Radiant Heating*, gives complete details, documents service records. Write for a copy.

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ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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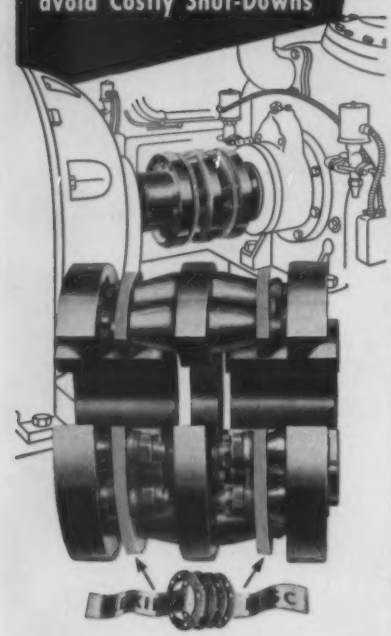
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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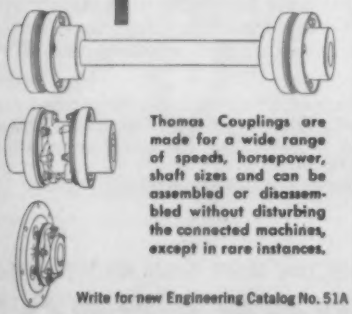
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.
For more facts circle 504 on Reply Card

'ROUND ABOUT

Conference of the National Association of Corrosion Engineers. The meeting will be held at the Hotel Statler, New York City, from March 12 to 16. In addition to discussion on corrosion principles, there will be three educational lectures on: Mechanism of Corrosion Inhibitor Action; Relationship of Thin Films to Corrosion and Techniques of Thin Film Study; and Effects of Velocity on Corrosion.

Personnel Changes

J. W. G. Belanger was promoted to plant engineer, taking over the mill maintenance responsibilities at the Kenora plant of Minnesota and Ontario Paper Co.

This position was formerly held by **E. O. Wood,** who will now take on the duties of full-time liaison between the company and H. A. Simons, Ltd., the engineering consultant responsible for plant design and supervision of construction in connection with the production expansion project at Kenora.

Advice on Care of Hands

FORMATION OF A Hand Protection Clinic established specifically to help industrial concerns solve problems relating to employee hand protection was announced recently by The Pioneer Rubber Co., Willard, Ohio.

Any firm confronted with such a problem can now write a description of it to the Clinic, where experts with more than 35 years in the industrial hand protection field will analyze the facts and recommend the right glove for the particular job involved. This service is free.

Reason for this service is to put at the disposal of industry the specialized hand protection knowledge, accumulated through years of testing and observation, of Pioneer's trained researchers.

If you have a particular hand protection problem in your plant write to Hand Protection Clinic, Pioneer Rubber Co., 296 Tiffin Road, Willard, Ohio.

Planning a Training Program

IN A RECENT talk, Fred W. Erhard, Assistant Director of the U. S. Department of Labor's Bureau of Apprenticeship, listed the three basic elements which should be considered when planning a training program.

These are: how to teach the skills required, how to develop job judgment and how to provide the necessary related technical information.

It is true that every industrial group has its own peculiar training problems. However, Mr. Erhard said that it is best to tackle such problems by dealing with those things that are common to the whole industry; supplying information that is needed for a sound approach to training and providing an exchange of ideas and methods that have proven successful.

Services of the Bureau of Apprenticeship's field representatives are available to any employer or labor group needing assistance in developing a training program. Or, you can write to James P. Mitchell, Secretary, Bureau of Apprenticeship, U. S. Department of Labor, Washington, D. C., on a specific problem.

New Appointment

Frederick L. Guyette has been appointed chief plant and equipment engineer for The New York Air Brake Co., makers of hydraulic, vacuum and liquid pumps.

He has served in various manufacturing capacities with the company for 25 years. In his new position, he will be responsible for plant layout, machine tools, buildings and equipment for the company's five manufacturing divisions.

GE Promotes Engineer

APPOINTMENT OF **Henry E. Heddesheimer** as consultant on electrical engineering in General Electric Company's Plant Engineering and Maintenance Services was announced recently by L. E. Clover, manager.

Heddesheimer joined General Electric in 1946 in the Plant Engineering Section of the Pittsfield, Massachusetts, works. In 1951 he was made supervisor of Plant Facilities and Plant Design of the new Power Transformer Plant at Rome, Georgia. He was supervisor of plant facilities and plant engineering there until transferred to his present position in the Manufacturing Services Division of the company.

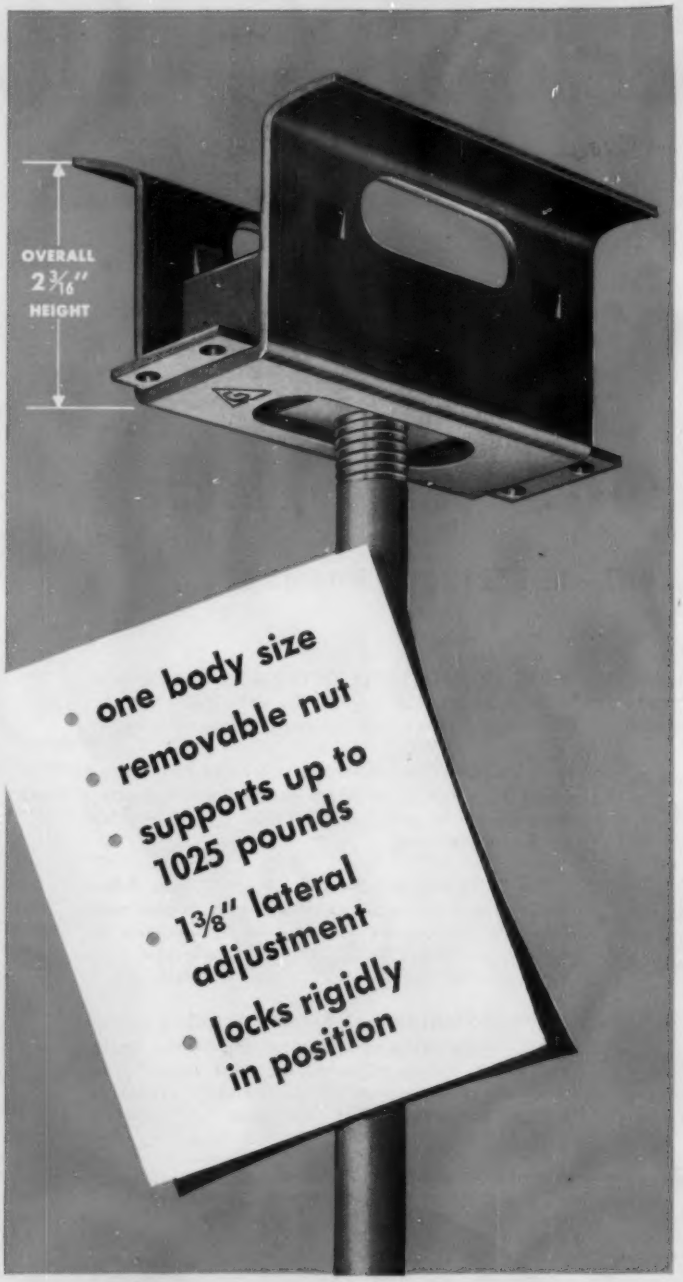
For Gulf Coast Engineers

ENGINEERS IN THE Gulf Coast area will be interested in following the progress of the Houston Technical and Scientific Center. When expansion plans are completed, the Center hopes to coordinate the activities of the various engineers' organization and technical societies in the area.

Such facilities as lecture halls, dining room, secretarial services, mailing and records storing, reading and reference room, headquarters for professional societies, technical and scientific displays, employment service, conference rooms and club offices will be available to the various engineers' organization that make it their meeting place.

Engineering societies in the area that would like to have more information should contact Mr. L. Keith Baldwin, President, Houston Engineers Club, 2615 Fannin St., Houston, Texas.

The new GRINNELL Wrought Steel CONCRETE INSERT



The newly designed Grinnell Wrought Steel Concrete Insert (fig. 280) is the economical answer to many overhead pipe suspension problems. It is made of heavy gauge steel and made to facilitate the use of various rod sizes. With but a single body size, manufacturing costs are reduced, ordering is easier, and installation simplified. This can mean a saving of time, trouble, and money for you.

The Grinnell Wrought Steel Concrete Insert is recessed to accommodate a special removable nut which is furnished with a 3/8, 1/2, 5/8 or 3/4 inch tapping. Once the rod or bolt is screwed tight, the nut is rigidly locked in place. Before tightening, the rod position may be adjusted laterally as much as 1 3/8 inches.

Thin-slab construction presents no problem. Overall height of insert, minus rod, is only 2 3/16 inches. The top edges are bent outward for solid anchoring. Slots in the sides will pass reinforcing rods up to 1/2 inch in diameter. With a load rating of 1025 pounds per unit (610 pounds for 3/8 inch rods), Grinnell's Wrought Steel Concrete Insert is rugged and inexpensive.

GRINNELL

AMERICA'S No. 1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Available from your local distributor

Grinnell Company, Inc., Providence, Rhode Island

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

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the lightest, most in its class, on the

CLECO'S NEW 2000 Series Grinder

WITH THE LIGHTWEIGHT, HI-STRENGTH HOUSING

Now, a 6-inch pneumatic grinder by Cleco that offers *more* power, safety, versatility, and dependability than any other grinder in its class on the market today.

Let us demonstrate these outstanding features in your plant:

GREATER POWER—A demonstration on your air lines will prove the extra power of the Cleco 2000.

LIGHTER—Weighs only 10½ pounds (without guard); over-all height, 7⅝"; lightweight design embodies hi-strength magnesium housing.

MAXIMUM OPERATOR SEE-ABILITY—Standard revolving safety guard for flanged cup wheels or optional cut-away wheel guard, which gives operator full view of work at all times.

EASIER, SAFER OPERATION—Sensitive snap handle gives operator instantaneous throttle control *while he maintains a full grip.*

MORE COMFORTABLE OPERATION—Three-position dead handle adjusts to suit the operator. Muffling device at air discharge reduces noise.

MORE VERSATILE—Throttle valve can be changed from snap handle to wing nut without changing handle. Speed settings available at either 4,500 rpm or 6,000 rpm.

LONGER LASTING—New built-in oil-mist lubricator injects a fine oil spray *while the motor runs.* Graphite-impregnated rotor blades, specially designed governor bearings, and a ball-type inlet valve extend the Cleco 2000's service-free life.

MORE DEPENDABLE—Factory-locked governor prevents tinkering or faulty setting by the operator, yet is easily adjusted by your repair shop without time-consuming disassembly and reassembly between tachometer tests.

FOR A DEMONSTRATION—CALL OR CONTACT YOUR NEAREST CLECO REPRESENTATIVE

CALIFORNIA: Los Angeles, 4131 South Figueroa St. • **GEORGIA:** Atlanta, 1299 Spring St. • **ILLINOIS:** Chicago 27, 5928 S. Pulaski Rd. • **MICHIGAN:** Detroit 21, 18071 Wyoming Ave. • **MISSOURI:** St. Louis 3, 2322 Locust St. • **NEW JERSEY:** Newark 4, 75 Lock St. • **PENNSYLVANIA:** Philadelphia 20, 5220 N. Fifth St. • **TEXAS:** Dallas 19, 2526 West Mockingbird Lane.

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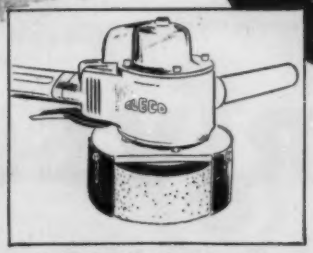
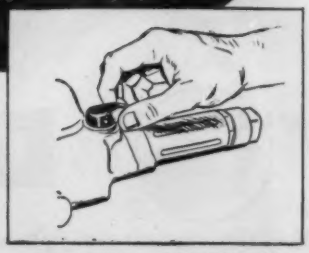
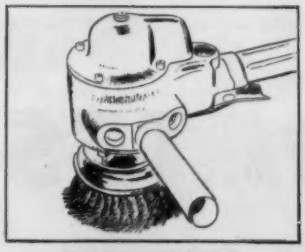
Proved superior in 35 industrial plants



OPTIONAL CUT-AWAY WHEEL GUARD



OPTIONAL WING NUT THROTTLE VALVE



WIRE BRUSH ATTACHMENT

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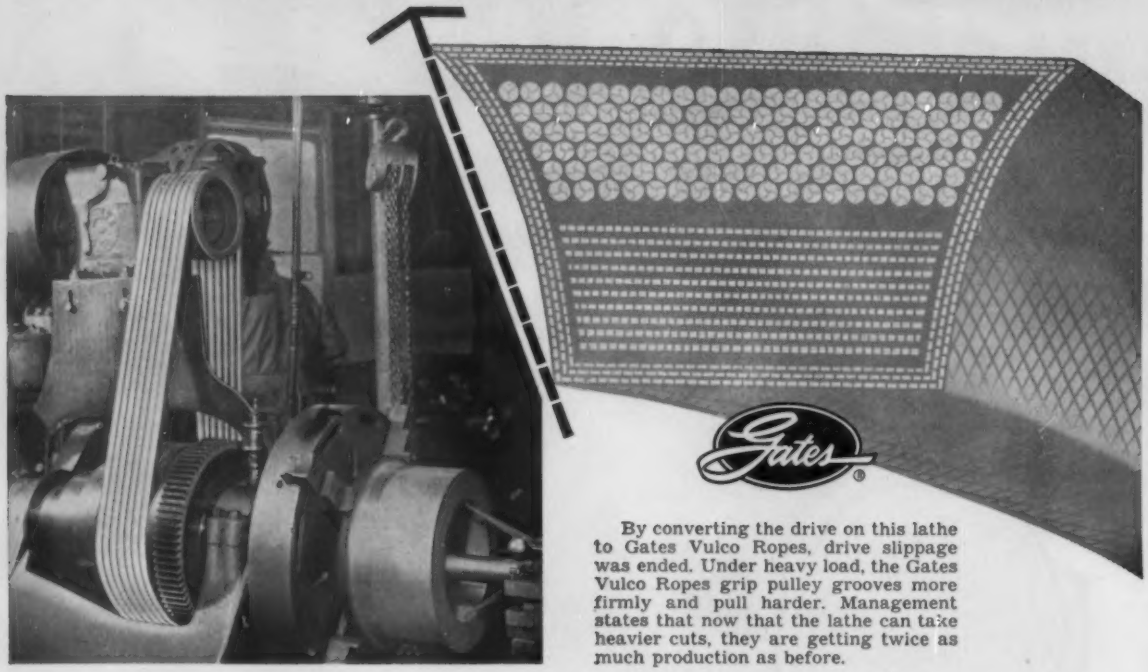
5999

"Secret" of *lower* belt costs is concave sides



By converting the drive on this lathe to Gates Vulco Ropes, drive slippage was ended. Under heavy load, the Gates Vulco Ropes grip pulley grooves more firmly and pull harder. Management states that now that the lathe can take heavier cuts, they are getting twice as much production as before.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides.*

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear.* Naturally, *even wear* means *longer wear.* And longer wear cuts belt replacement costs...reduces down time...contributes to profits.

Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 46-A

GATES VULCO ROPE DRIVES

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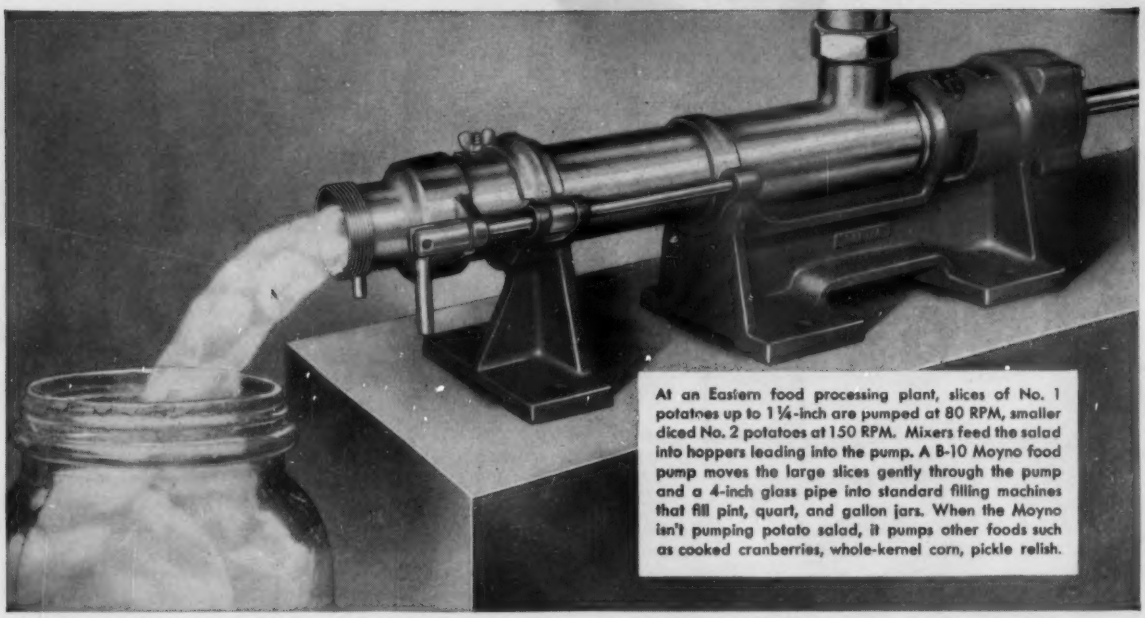

At an Eastern food processing plant, slices of No. 1 potatoes up to 1¼-inch are pumped at 80 RPM, smaller diced No. 2 potatoes at 150 RPM. Mixers feed the salad into hoppers leading into the pump. A B-10 Moyno food pump moves the large slices gently through the pump and a 4-inch glass pipe into standard filling machines that fill pint, quart, and gallon jars. When the Moyno isn't pumping potato salad, it pumps other foods such as cooked cranberries, whole-kernel corn, pickle relish.

Unusual Pumping Problem? Maybe This Moyno® Pump Can Help You Solve It

The Moyno can pump potato salad and a lot of other materials without making mush out of them—because of the unique *progressing cavity* principle.

Moynos have no valves and pistons, no vanes or other devices that cause churning and turbulence. The Moyno has a simple screw-like rotor turning within a double-threaded stator. This design creates cavities which progress smoothly toward the discharge end of the pump, carrying the material being handled. The material is not squeezed or churned.

Pumps Practically Anything

That's why the Moyno successfully handles such hard-to-pump materials as non-pourable pastes, frits, plaster, highly volatile liquids, and materials containing large particles, such as potato salad, fruit, cherries, chow mein—even oysters! In fact, the Moyno handles practically anything that will pass through a pipe.

Wide Range of Sizes

Moynos pump many hard-to-pump materials with a minimum of abrasion and wear. Many plants have adopted Moynos simply because they last so long.

Moynos provide positive displacement. Moynos can pull up to 29 inches vacuum while discharging under pressure. Big Moynos deliver up to 500 gpm; can provide pressures up to 600 psi in the smaller frame sizes. They even get up to 1000 psi momentarily.

The Moyno is reversible—it pumps equally efficiently in either direction.

With the Moyno, accurately metered flows are obtainable by regulating operating speed.

Moynos are trouble-free. They are self priming; won't cavitate or vapor-lock. There's just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain. Moyno pumps are easy to take apart for cleaning.

Write For Bulletin

You may save a good deal of money or solve a tough problem by finding out about this simple, versatile pump. Write for Bulletin 30PE.

HOW IT WORKS

Rotor is like a stretched-out corkscrew. It turns within a stator that has a double internal thread. Thus rotor and stator form closely fitted cavities. As the rotor turns, these cavities progress evenly toward the discharge end of the pump without closing up. That's why the Moyno easily handles materials without crushing, churning, or aerating; and why it can handle so many different things—solids in suspension, pastes, abrasives, highly volatile liquids, tars, soaps, caustics—even cement and plaster.

FOR DESIGN ENGINEERS

Moynos are available in small sizes and special designs for use in automatic washers, drink dispensers, sprayers, oil burners, machine tools, gasoline pumps, and a wide variety of other equipment. If you are designing machinery, we'll work with you, in confidence, to integrate pump design with your problem.

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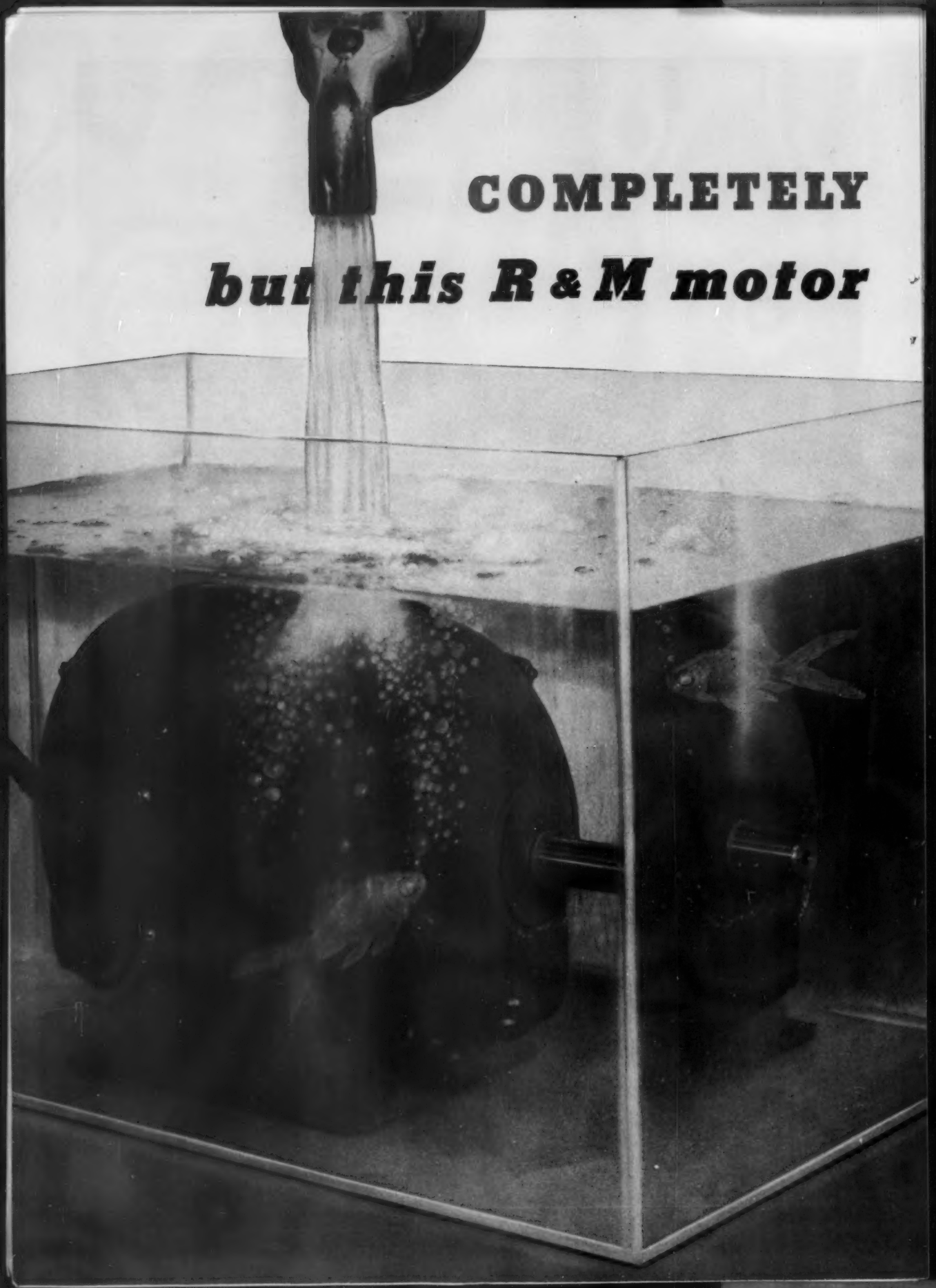

COMPLETELY
but this R & M motor

COVERED WITH WATER

is still going strong!

R & M's COMPLETE "WEATHERIZING" PROCESS GIVES IT LASTING PROTECTION AGAINST MOISTURE

A recent plant survey showed that one of the principal causes of motor failure is *humidity . . . moisture . . . dampness.* Obviously, this R&M "All-Weather" Motor was subject to more than simple humidity when it was completely "dunked" in a water tank and allowed to run for twenty-four hours. But the test was an *accelerated* version of what happens to motors over a period of months or years.

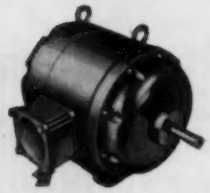
This R&M Motor ran perfectly . . . *under* water, *after* being taken out but still wet . . . and after being dried out! It's an outstanding example of how R&M "Weatherizing" pays off in more trouble-free motor performance.

Just what is "Weatherizing"? It's a process where steel parts are undercoated with a special rust-resisting compound—dipped and then *baked* on; a method of spraying the entire shaft, the rotor and the fan to protect these parts against corrosion; a treatment for all cast-iron parts, as specified by the Armed Forces for motors used in damp or tropical locations; an elaborate system of pre-heating, dipping and baking the entire winding; special sealing of coils.

Here's a motor built with the *extra* care that gives you an *extra* margin of safety . . . available at a *standard* motor price!

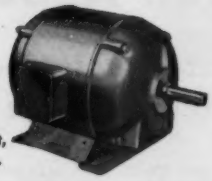
from 1 to 200 horsepower... R&M

if it's an **R&M**, *it's the right motor!*

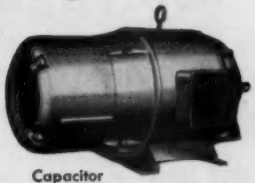


Explosion-Proof, Totally Enclosed Fan-Cooled, 1 to 40 h.p.

Frequency Converters, 2½ to 15 K.W.



Direct Current, 1 to 7½ h.p.



Capacitor Single Phase, 1 to 15 h.p.

ROBBINS & MYERS, INC.

"All-Weather" is a Robbins & Myers trademark.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Mail the coupon TODAY! **Get more information on the finest motor your money can buy!**

Robbins & Myers, Inc., Springfield 99, Ohio PE

☐ Please send illustrated Integral Motor Catalog, showing all the extra features of R&M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

☐ Explosion-Proof Motors
☐ Capacitor Single-Phase Motors
☐ Totally Enclosed Fan-Cooled Motors
☐ Frequency Converters

Name.....

Title.....

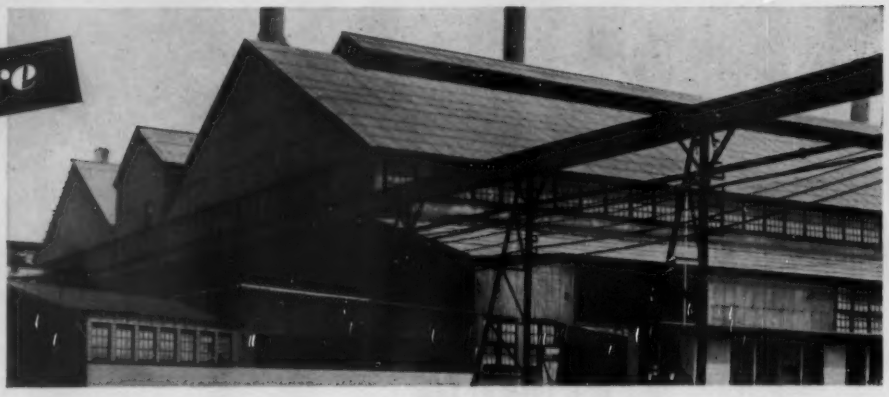
Company.....

Address.....

City.....*Zone*....*State*....

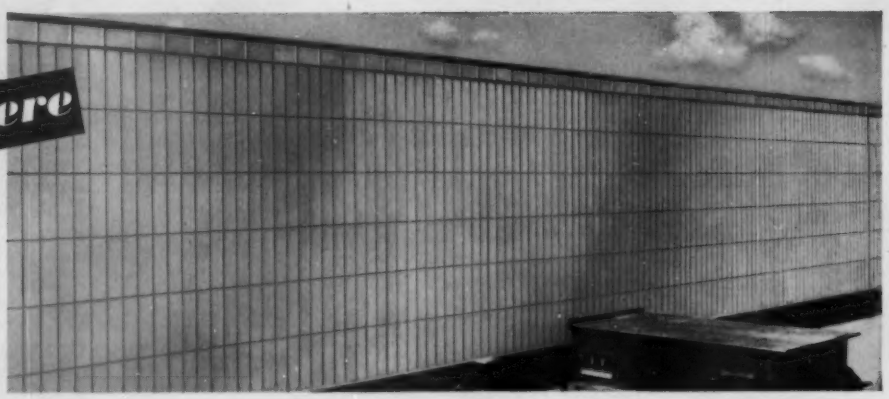
No costly maintenance problem

...here



On this steel plant, roofs and sidewalls of Johns-Manville Corrugated Transite withstand corrosive fumes . . . will never corrode or rot.

...or here



On this aircraft plant, stonelike Corrugated Transite sidewalls offer years of service without paint or special treatment to preserve them.

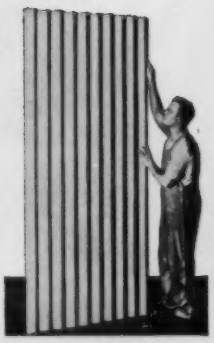
build with Johns-Manville Corrugated Asbestos Transite

For maintenance-free roofs and sidewalls plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof, rotproof and weatherproof. Corrugated Transite is also used increasingly for interiors. The streamlined corrugations and attractive shadow lines offer interesting design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure. Write Johns-Manville, Box 158, Department PE, New York 16, New York. In Canada write 565 Lakeshore Road East, Port Credit, Ontario.



- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

See "MEET THE PRESS" on NBC-TV, sponsored on alternate Sundays by Johns-Manville

JOHNS MANVILLE JM PRODUCTS **Johns-Manville**

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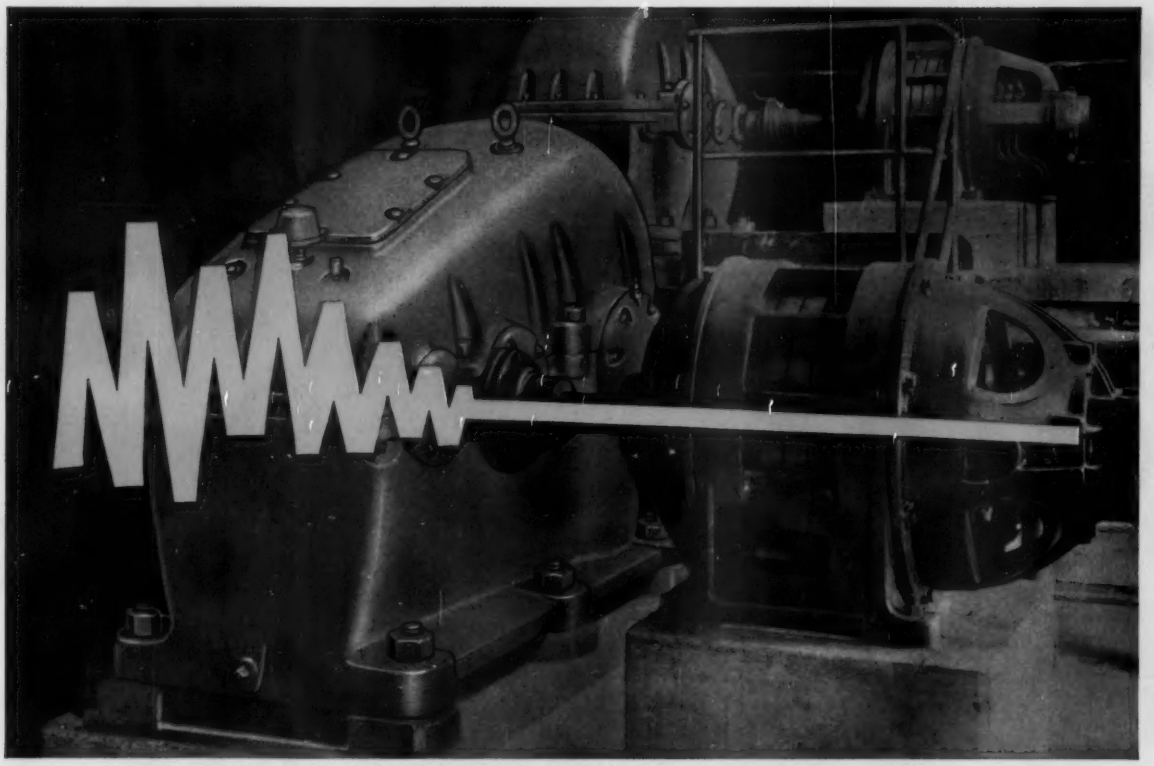

Compact, rugged Link-Belt Parallel Shaft Drive "shrugs off" shock loads. Available with ratios up to 300:1 and horsepower capacities to over 2000.

Rugged LINK-BELT Parallel Shaft Drives

"shrug off" shock loads

WHEN it comes to judging a drive's resistance to shock and frequent overloading, ratings tell only half the story. It's these construction refinements of Link-Belt Parallel Shaft Drives that give you further assurance of long-range speed reduction economy:

GEARS are precision machined, shafts rigidly supported.

BALL AND ROLLER BEARINGS are used throughout.

GREASE-LUBRICATED SEALS block shaft openings to dirt.

AUTOMATIC SPLASH LUBRICATION cuts maintenance.

You'll find, too, that Link-Belt has simplified inspection and maintenance by making all parts accessible without disturbing the base. And to prevent reverse rotation on conveyors, elevators and similar equipment, a built-in backstop can be provided.

There are many more facts worth knowing—as well as specifications and application data — in Book 2619, available from your Link-Belt office or authorized stock-carrying distributor. Or write direct.

Get JOB-MATED drive combinations from the complete Link-Belt line

In addition to parallel shaft gear drives, Link-Belt builds in-line helical and worm gear drives, Gearmotors, Motogears, variable speed drives, fluid drives, chains, sprockets, couplings, bearings, etc. All are pre-engineered for easy installation and maximum efficiency.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,765

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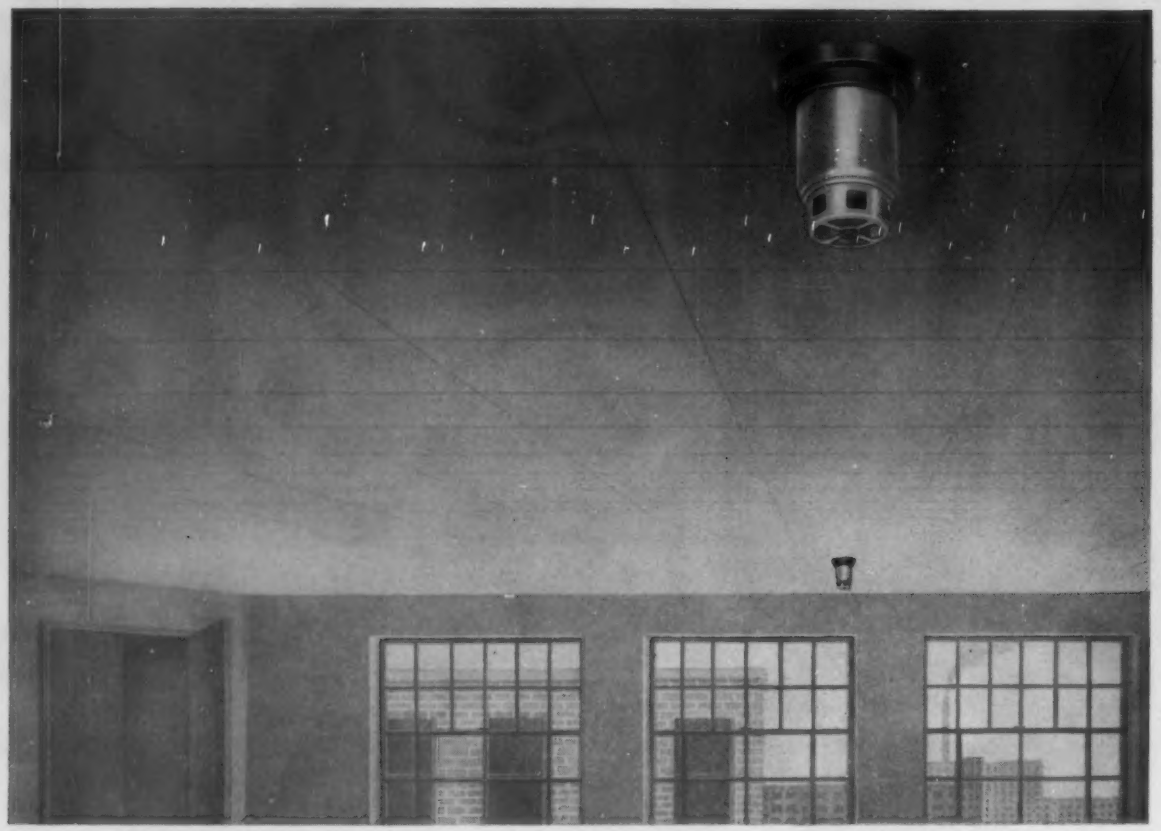
New, radio-active, automatic fire guard!

C-O-TWO PRE-DETECTOR SYSTEM



Each pre-detector head protects up to 3,600 square feet of area... harmless radio-active element utilizing ionization chamber principle quickly detects all forms of fire... requires only simple two-wire circuit and insignificant wall space for controls.

This completely new and positive means of spotting fire is just what you've always needed and wanted . . . detects in the earliest stage, invisible combustion gases, visible smoke, slow smoldering, as well as open flame. The C-O-TWO Pre-Detector System is simple to install, extremely economical to maintain and doesn't depend on thick smoke or heat for actuation.

As many pre-detector heads as necessary can be connected together in a single circuit and up to 16 separate circuits or spaces handled by one system. With a single circuit the pre-detector heads are connected directly to the fire indicating cabinet, while with multiple circuits the pre-detector heads are first connected to one or more space indicating cabinets capable of visually showing by number the exact location of the fire. Relays perform such functions as sounding alarms, closing fire doors, shutting down ventilation and releasing fire extinguishing systems.

The C-O-TWO Pre-Detector System has been subjected to extensive testing and carries Underwriters' Laboratories, Inc. listing, as well as Factory Mutual Laboratories approval. Proven pilot installations have been made in such diversified properties as a television station, an electric power company network analyzer room, a railroad signal tower, an airline flight training equipment room and the offices of an insurance company.

Don't take unnecessary chances any longer . . . the extensive fire protection experience of PYRENE—C-O-TWO over the years is at your disposal without obligation. Get complete facts about this new C-O-TWO Pre-Detector System today!

Pyrene

PYRENE — C-O-TWO

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Sales and Service in the Principal Cities of United States and Canada

C-O-TWO

COMPLETE FIRE PROTECTION

portable fire extinguishers . . . built-in fire detecting and fire extinguishing systems

CARBON DIOXIDE • DRY CHEMICAL • VAPORIZING LIQUID • SODA-ACID • WATER • CHEMICAL FOAM • AIR FOAM

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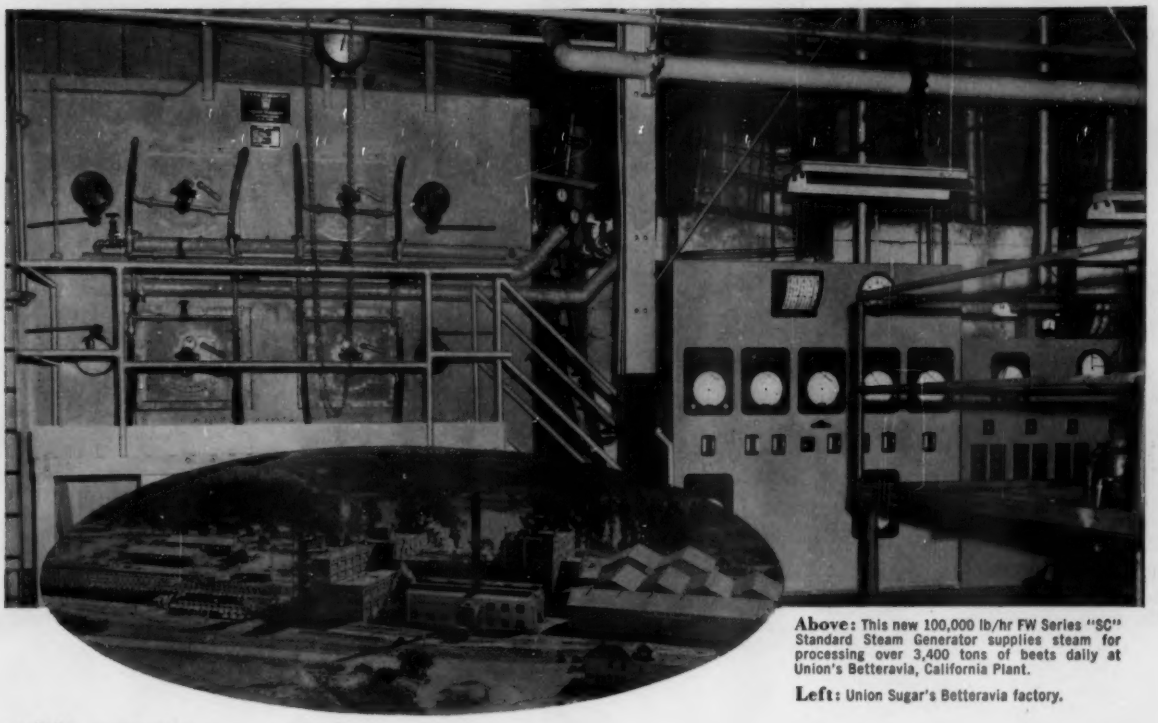
Union Sugar

obtains low-cost steam



Above: This new 100,000 lb/hr FW Series "SC" Standard Steam Generator supplies steam for processing over 3,400 tons of beets daily at Union's Betteravia, California Plant.

Left: Union Sugar's Betteravia factory.

with a new

FW Series "SC" steam generator

This new Foster Wheeler "SC" Series Standard Steam Generator is a part of a continuing modernization and expansion program being carried on by the Union Sugar Division of Consolidated Foods Corporation, a pioneer California beet sugar company.

In selecting this unit, Union has taken advantage of the latest development by Foster Wheeler toward the reduction of industrial steam costs. This new generator embodies advanced design features which result in low installation, operating and maintenance expenses.

Maximum dependability under continuous full-load is assured by such advantages as: completely water-cooled furnace, fully drainable superheater, highly efficient boiler surface arrangement, and unrestricted circulation. The design also provides flexibility in heat recovery equipment, balanced or pressurized firing and steam purifying systems.

Fuels: Oil or gas—*Steam Temperatures:* Saturated to 950F—*Capacities:* 50,000 to 150,000 lb/hr—*Pressures:* to 1500 psi.

For complete information, write for Bulletin B 55-4, *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

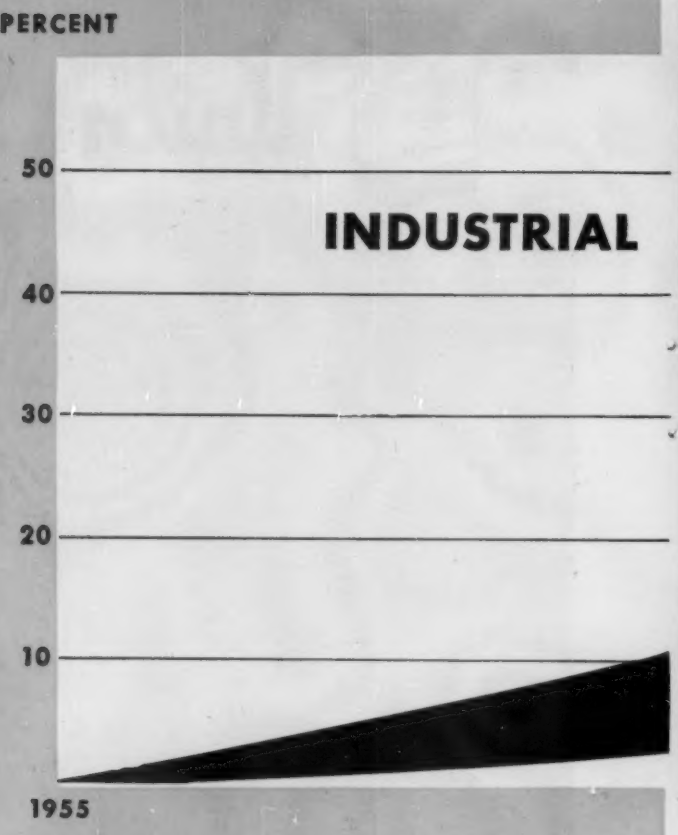
FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 513 on Reply Card

By 1965...

H. F. McCULLOUGH, general manager, Service Shops Department, General Electric Co. explains below why . . .



WITH INCREASED EMPHASIS ON AUTOMATION . . .

"Accent on maintenance" becomes industry's

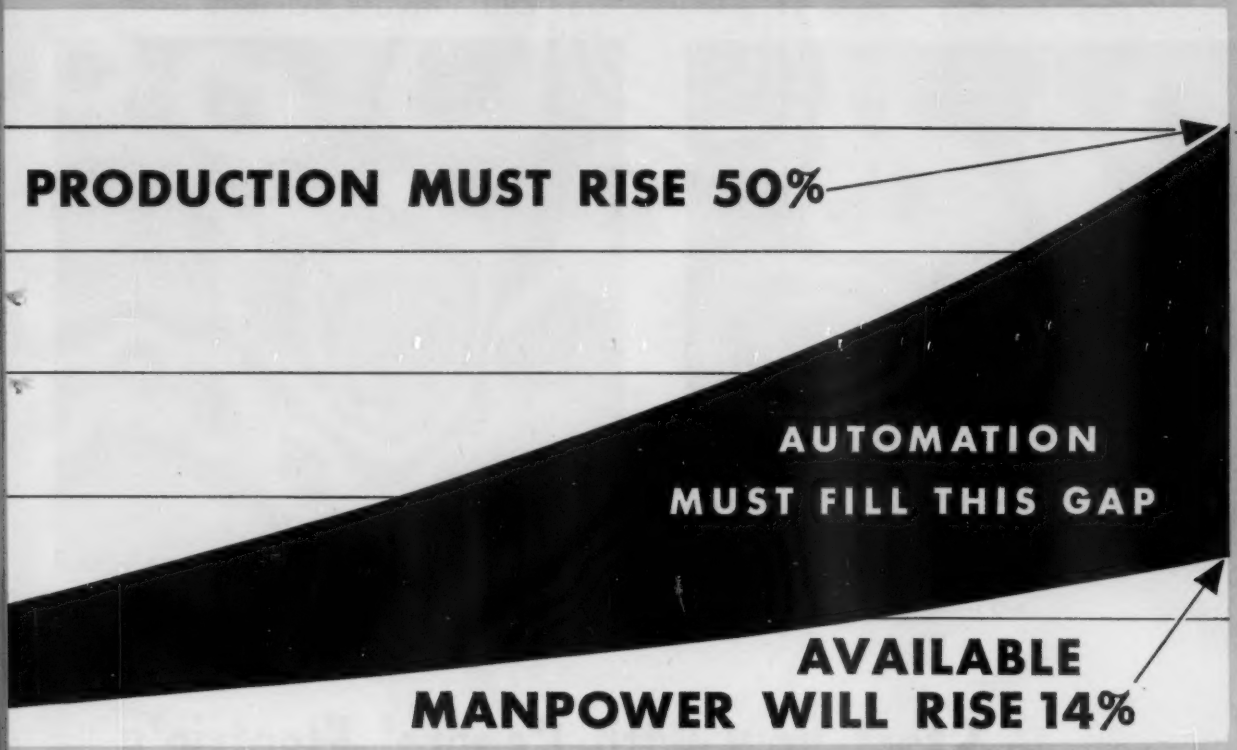
It's no secret that American industry today is making giant strides into a new era—marked by the increased use of automatic machines, more continuous process methods, and a greater application of electric power per manhour. This era of automation is a result of the sharpening of competition, requiring more production from existing equipment, better methods for making better products, and better machines to do more work at less cost.

• **Taken for granted**—But all this is focussing new attention on a production factor hitherto taken for granted—maintenance. For as more automatic machines are introduced to quicken the production tempo, and to make up for limited available manpower and to reduce product cost, the maintenance function assumes a far greater importance. As one indication of this, the cost of all industrial maintenance in 1952 was over $11 billion, while by 1965 it is estimated to reach $22 billion annually.

• **Production demands**—Present and future production demands require the training of highly skilled and well planned maintenance to prevent idle machinery and profit-eating downtime costs. The ultimate aim of any maintenance program is to reduce unit cost of goods sold; therefore, planned maintenance helps the manufacturer do this by getting the maximum use from his equipment and reminding him to make modifications or renewals on a planned rather than a hit-or-miss basis. With this trend towards automation, today's stepped-up production combined with increased labor, materials and equipment costs dictates a scheduled maintenance program.

• **Maintenance not ready**—On its present scale, maintenance cannot successfully cope with the staggering job ahead. To back up the abilities of maintenance men and their effective use of tools and materials, management too must apply to maintenance the same skill, brains and capital investment that have so strikingly improved production planning and techniques. In fact, with automation, production itself depends largely on the proper planning and execution of equipment maintenance.

• **Involuntary shutdown**—It must be remembered that an emergency downtime during production not only results in



key to all future production planning

lost production and profits, but also forces upon labor an involuntary layoff; therefore, machinery equipment failure is as disastrous for all when it occurs on a production line geared for high production with a large degree of automation. Again it comes down to the question of maintenance. Does management wait for a failure then apply maintenance on a put-out-the-fire basis or does management put into effect good maintenance practices, scheduling maintenance at times most convenient to the production line. Scheduled maintenance minimizes the "dollar" loss. Naturally all emergency shutdowns cannot be eliminated, but Productive Maintenance can and is reducing such situations.

• **Management and maintenance**—One fact that emerges is that management and maintenance must join forces in a carefully thought-out program to meet the challenge of automation. Both are part of the company team, interested in bringing the many benefits of planned equipment maintenance to the over-all job of delivering goods to customers on time, using manpower most efficiently, and keeping product cost low.

FOR AN EFFECTIVE APPROACH TO THIS IMPORTANT PROBLEM

GENERAL ELECTRIC

When management teams up with maintenance, the result is

YOUR G-E MAINTENANCE SPECIALIST will supply complete parts data . . .

. . . guide you in planning routine inspection, routine maintenance and parts inventories . . .

Start now with General Electric's

HERE'S THE 5-STEP PLAN IN BRIEF: (and General Electric can help you with every step)	**1** Gather complete equipment data from your machines and motors	**2** Evaluate routine maintenance to determine how much care is warranted
3 Establish a routine operating control system	**4** Evaluate the critical maintenance that is needed	**5** Establish a critical maintenance program

more effective maintenance that actually adds production capacity

. . . help you determine condition of all critical equipment and help schedule planned overhaul . . .

. . . help analyze critical equipment for best protection of each machine.

5-step *Productive Maintenance* plan

It organizes the application of men, tools and materials to help protect capital investment, increase productivity, reduce product cost

A practical, realistic approach to the growing importance of maintenance in the automation era is General Electric's Productive Maintenance plan. In a simple 5-step sequence, it organizes the elements involved in controlling equipment downtime to improve maintenance of electrical systems. Because it is applicable to any type of industrial operation, it is becoming widely accepted throughout industry by management and maintenance men alike. Learn more about how this plan can help you obtain more output from existing facilities. Use the coupon to have a G-E Maintenance Specialist call and supply you with complete information. General Electric Co., Schenectady 5, N. Y.

General Electric Company
Apparatus Sales Division, Section F801-17
Schenectady 5, New York

- ☐ Please send me the detailed manual (GEA-6087) on setting up a Productive Maintenance Program in my plant.
- ☐ Please have a Maintenance Specialist from my nearest G-E Service Shop call on me.
- ☐ I would like to schedule a showing of the film "Productive Maintenance."

NAME.....

POSITION.....

COMPANY.....

CITY..... STATE.....

***Productive Maintenance*—as vital as production itself!**

GENERAL ELECTRIC

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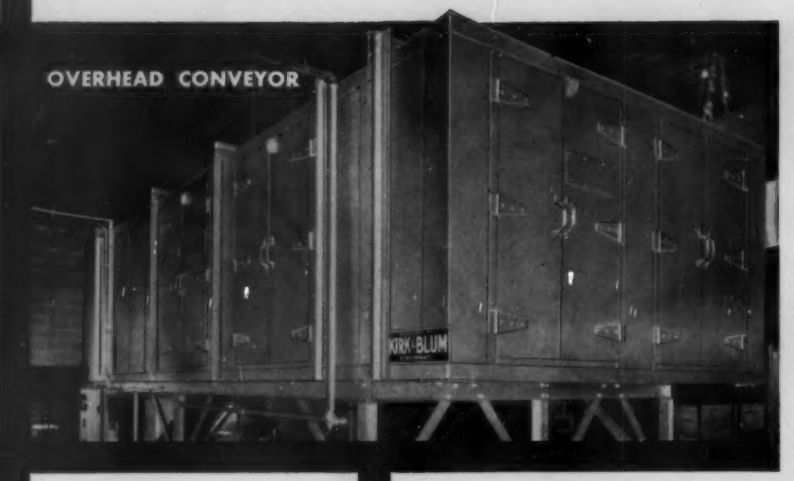
BELT CONVEYOR

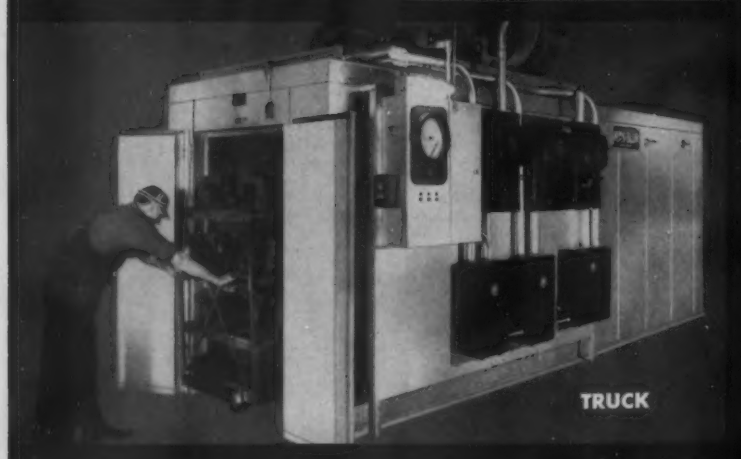


OVERHEAD CONVEYOR

TRAY

what type OVEN do you need?

KIRK & BLUM INDUSTRIAL OVENS



TRUCK

Your oven needs . . . large or small, batch or conveyorized production, for drying, baking or dehydrating . . . can be filled by KIRK & BLUM.

Compactly designed and expertly engineered to meet specific requirements, these typical installations show the wide range of KIRK & BLUM experience over more than 48 years. Often, ovens up to freight car size are shipped assembled, ready to operate.

Put this skill and experience to work on your industrial oven problem. For complete information and booklet, write: The Kirk & Blum Mfg. Co., 3189 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM

ALLOY FABRICATION

For more facts circle 515 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 **For Overhead Handling**—Revised Booklet 2008-L, 12-pp, features engineering and application data on overhead materials handling equipment. Photos and drawings show a variety of installations and equipment details. An analysis of stresses in a number of types of overhead tracks is provided. The subject of track peening is covered, and such products as track switches, carriers, tractors, cranes, transfer cranes, gantry cranes, automatic handling systems, interlocks, etc. are described. The Cleveland Crane & Engineering Co.

102 **Traveling Cranes**—Catalog 62, 20-pp, describes company's line of motor driven traveling cranes. Lists crane specifications for component parts and includes photos and diagrams showing assembly views. Clearance dimensions are tabulated for double beam overhead traveling cranes and single beam overhead and underhung cranes. Reading Crane & Hoist Corp.

103 **Roller Conveyor**—Six-pp Bulletin GP describes a general purpose conveyor, giving types and sizes available, illustrations of typical installations and key product features. Also summarizes complete engineered roller line from which the general purpose line was selected. The Alvey-Ferguson Co.

104 **Electric Tiering Truck**—Advantages of company's Reach Fork truck which will reach out and pick up or deposit 3000 lb loads are outlined in Bulletin 841. Describes features of two models and gives complete specifications, as well as including application photos. The Raymond Corp.

105 **Electric Pallet Truck**—Circular 34-C describes in detail company's short-coupled jacklift electric truck, described as the shortest "walkie" electric pallet truck on the market—only 25⅞ in. longer than the fork length. Includes photos, drawings and specifications. Lewis-Shepard Products, Inc.

106 **Platform High Lift**—Bulletin 551-3 features a walking-type battery-powered platform highlift truck, company's Model PO-40. Gives specifications and advanced features of this unit which is designed to speed moving and stacking of skids, box tops, cases, crates. Barrett-Cravens Co.

107 **Floor Trucks, Wheels**—Twelve-pp Catalog 56G describes application of balance style trucks to trailer-train operation, illustrating 49 models of two wheel and platform trucks, 12 types of dollies and 15 styles of casters. Application photos and specifications are included. Nutting Truck and Caster Co.

108 **Crawler Tractor**—The technical and operating story of manufacturer's 45 drawbar hp HD-6 diesel-powered crawler tractor is told in Catalog MS-461. Engineering, design and performance features are explained with the help of photos, and illustrations are also used in reviewing the engine which powers the tractor. In addition to specifications, the catalog lists matched equipment and accessories. Allis-Chalmers Mfg. Co.

109 **Tractor Shovel**—The engineering, design and production stories of company's HD-11G tractor shovel are pictorially presented in 8-pp Catalog MS-460. Includes specifications and describes various features which mean easier servicing for less time-down, greater operator comfort. Allis-Chalmers Mfg. Co.

110 **On Payload Profits**—"The Road to Payload Profits" is a 50-pp illustrated booklet demonstrating how lightweight aluminum trailers increase payload profits by decreasing the amount of "dead weight" carried by trucks of heavier materials. Develops a series of case histories, pointing out economic values of aluminum equipment. Aluminum Co. of America.

111 **Loading Docks**—Solutions to 13 dock loading and yard loading problems are outlined in this illustrated folder. In each case, a line drawing is used to illustrate the problem, and a photo shows how it was solved by company's Magcoa magnesium dockboard or yard ramp. Materials Handling Div., Magnesium Co. of America.

112 **Automatic Elevators**—Automation in elevators is described in this 20-pp booklet, "The Growth of Automatic Elevators", illustrated with photos of latest devices in modern buildings and valuable graphs and charts. A history of early elevators precedes details of improvements in today's elevators leading to the development of the automatic elevator. Charles W. Lerch & Associates.

113 **Wire Rope Slings**—This will chart features data on company's wire rope slings, lists diameters and lifting capacities of the Strand-Laid type slings. Chart is edged top and bottom with metal strips, and can be hung by an eyelet on upper strip. American Chain & Cable Co., Inc.

114 **Roller Chains**—Hints on conveying with roller chains and attachments are provided in Bulletin 55-11. Shows stock, made-to-order, and special attachments which can be furnished with Rex roller chain. Chain Belt Co.

PUMPS, PUMPING

115 **Boiler Feed Pump**—Bulletin 08B7899, 16-pp, describes design features and principal advantages of company's barrel type boiler feed pumps. Shows why balanced thrust design gives radial and axial balance for greatest reliability and for smooth operation and longer pump life. Allis-Chalmers Mfg. Co.

116 **Water Circulating Pumps**—Bulletin HC-855 features a centrifugal pump made especially for large circulating water systems where smooth and silent operation is required. Shows how pump can be used to boost city water pressure in tall buildings. Includes diagrams and a table showing sizes and dimensions. Bell & Gossett Co.

117 **Plastic Pumps**—Catalog 55 on plastic pumps, includes illustrations and diagrams of both standard and XB models. Complete operating and performance data along with materials of construction and recommended application tables make this a useful condensed catalog. Details are given on design, and specifications and photos are included. Vanton Pump and Equipment Corp.

118 **Pumps for Oil Industry**—Section G, 14-pp, of company's catalog on rotary pumps describes pumps designed for the oil industry. Includes chart on the selection of proper materials and describes standard twin and multiple units, all weather twin and multiple units, and truck mounting pumps. Photos, diagrams, tables of dimensions and specifications complete the booklet. Viking Pump Co.

MECHANICAL POWER TRANSMISSION

119 **Electro-Magnetic Drive**—Form WEB-6194 LO-M, 8-pp, is an application analysis report covering 21 ways in which company's standard units can be applied to power transmission drives. A wide range of industries is covered, including machine tools, packaging machinery, textile machines, welding equipment, molding machines and printing equipment. Points out advantages of electro-magnetic drive in providing faster, smoother starts and stops. Warner Electric Brake & Clutch Co.

120 **Variable Speed Drive**—Bulletin A-643 features company's line of variable speed drives, describing variable sheaves, companion sheaves, sealed-life "R" and "W" belts, and slide motor bases. Includes specification data, and rating tables. Dodge Mfg. Corp.

121 **Versatile Drive**—Bulletin 4400-PRD-229 illustrates the Ampli-Speed magnetic drive for use for both fan-type and constant torque loads. Construction features are shown, and drawings illustrate relationship of drive to its magnetic amplifier control, the driving motor and the driven load. Advantages offered by this drive are listed. Also included are horsepower ratings, speed ranges, dimensions. Electric Machinery Mfg. Co.

122 **Electric Brakes and Clutches**—This 8-pp application analysis report pictures and describes 21 of the numerous ways in which company's standard units can be applied to power transmission drives. A wide range of industries is covered including: machine tools, packaging machinery, textile machines, welding equipment, molding machines, and printing equipment. Points out advantages such as faster, smoother stops and starts, others. Warner Electric Brake & Clutch Co.

123 **Couplings in Action**—Twelve-pp Form 12 contains a number of case histories of power transmission problems solved by this company's Amerigear coupling. They deal with use in heavy mill service, high-speed turbines, hydraulic presses, 'round-the-clock power supply and others. Generously illustrated with photos and drawings, booklet also tells how fully-crowned tooth design contributes to efficiency of the coupling. American Flexible Coupling Co.

124 **Flexible Couplings**—All metal flexible couplings are presented as to advantages and applications in Form 82. Photos show installations. Thomas Flexible Coupling Co.

BOILERS, GENERATORS

126 **Steam Generators**—Bulletin 55-1, 22-pp, describes company's products and services, including steam generators and custom metal fabrication. There are many photos of production department, engineering office, and boilers in various stages of assembly. Engineering drawings of boilers producing up to 500,000 lb of steam per hr on standard fuels are included, as well as illustrations of units for waste heat application and those designed to utilize refuse for fuels—wood chips, coffee grounds. The Wickes Boiler Co.

On pages 181-182 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

127 **Heating Boilers**—Revised Catalog S-55 shows company's low pressure heating boilers in two series: the 500 for automatic firing of oil, gas or coal; the H-500 for hand fired coal. Cross section installation and dimensional views with complete engineering data for 19 standard sizes make this a useful reference book. Erie City Iron Works.

128 **Steam Generator**—Bulletin PSG-2, 10-pp, describes design and construction details of company's line of package unit steam generators. Includes photos, diagrams, and table listing capacities, dimensions and weights. Henry Vogt Machine Co.

PIPING, VALVES, FITTINGS

129 **Aluminum Pipe and Fittings**—Aluminum pipe—for conveying everything from air to acid—is described in this 18-pp Form AD197. Booklet presents characteristics and advantages for each major field of application. Specifications are provided, along with a description of appropriate fittings and methods of installation. Describes process industry applications and advantages. Similar treatment is accorded other fields, including pipelines, portable piping, and structural piping. Aluminum Co. of America.

130 **Sand-Spun Pipe**—Data Sheet Wa describes construction and application of Ashcolite pipe and couplings for pneumatic and hydraulic materials handling systems. Advantages of this sand-spun pipe—uniform wall thickness, wear resistance, freedom from blow-holes—are explained. Line drawings, diagrams, schematics included. The Allen-Sherman-Hoff Co.

BULLETINS

(Begins on page 21)

131 **Graphitization in Piping**—"Considerations in the Evaluation of Graphitization in Piping Systems," (Reprint TR-594) is a 10-pp illustrated article. Subjects discussed include sampling procedure; bend testing, impact toughness evaluation, and metallographic evaluation; uniformity of graphitization; and heat treatment. Grinnell Co., Inc.

132 **Valve Selection Tables**—This valve selection chart features helpful selection data on forged needle valves, bar stock valves, and toggle valves. Includes specifications, typical uses, dimensions, and mounting tips, a valve sizing table and a corrosion resistance table. Hoke Inc.

133 **Flexible Ball Joint**—Catalog 215-B, 20-pp, describes advantages of company's flexible ball joints for use in piping for power, process, heating, chemical, construction, or hydraulic service. Includes engineering specifications and data on the standard 300 lb series and a series for higher pressures. Screwed, flanged and welding end joints are listed, as are insulating joints and jacketed joints for handling asphalt and similar liquids. Barco Mfg. Co.

134 **Quick-Seal Couplings**—Quick connect-disconnect hose couplings are featured in 20-pp Form 7-55-20. Includes large cut-away views of coupling showing design and construction features. Single-check valve and double-check valve modifications which seal off one or both ends of a fluid line the instant coupling is disconnected are also covered. Tables and diagrams listing sizes and types of hose connection, and selection information are included. Titeflex, Inc.

135 **Hose Couplings**—Data Sheet 3100 gives specifications and recommended uses on hose couplings and fittings. Types shown include short and long shank common couplings, barbed insert, quick-acting, reattachable, interlocking high pressure couplings. Also describes other methods of joining hose—clamps, nipples, hose joint, flanges. B. F. Goodrich Co.

136 **Valve Couplings**—Bulletin 551 presents engineering data on company's line of valve couplings, hose couplings and hose clamps. Includes dimensions for valve couplings, price list, and a table showing dimensions of standard hose couplings. C. B. Hunt & Son, Inc.

ELECTRICAL

137 **Rerated Motors**—Bulletin N-100-R, 16-pp, describes this company's Series 100 motors and explains why these smaller, lighter motors are cooler running. Design features are illustrated in color and discussed, and dimensional data provided. Booklet stresses advantages in operating efficiency and dependability incorporated in the new NEMA frame sizes and offers information of value in selecting proper motor for a particular job. Howell Electric Motors Co.

138 **Distribution Transformers**—Bulletin 61B6159E, 16-pp, explains how electrical system operating conditions can be improved through use of company's distribution transformers. Tells how transformers make use of "Curva-core" construction. It describes coil, tank and bushing design and construction. Mechanical information as well as recommended installation practice is included. Allis-Chalmers Mfg. Co.

139 **Improved Switchboards**—"Switchboards With Basic Circuits," Bulletin GEA-4127B, 40-pp, discusses company's "building block" concept as applied to switchboards. Shows how eight classifications are constructed, operated and tested. A complete discussion of basic circuit specifications in duplex switchboards is included. Bulletin is illustrated with numerous photos, circuit diagrams. General Electric Co.

140 **Metal-Clad Switchgear**—Advantages offered by this company's indoor and outdoor metal-clad switchgear are explained by photo and text in 28-pp Form 7004-C. Shows construction details of the 7.5 and 15 kv switchgear with drawout air magnetic circuit breakers and provides ratings. Compartment isolation provided, arrangements for control and auxiliary equipment, easy handling, safety devices, design simplicity and other features are covered. Drawings illustrate dimensions, standard arrangements. I-T-E Circuit Breaker Co.

141 **Raceways and Fittings**—Many new fittings are presented in Catalog and Wiring Guide 20, a 132-pp pocket size manual and ordering booklet. Generously illustrated with photos and sketches, this practical booklet includes dimensions, descriptions and wire capacities of raceways, and pertinent data on fittings and accessories for use with them. Similar information is provided for overfloor wiring systems, surface wiring systems and multi-outlet systems, and interconnecting fittings. Installation suggestions and fastening procedures are included. The Wiremold Co.

142 **Portable Tool Electrification**—Bulletin 51 details advantages of company's system of enclosed trolley busway electrification. Tells what it is and what it does, and pictures applications in production, assembly and test lines. Feedrail Corp.

INSTRUMENTS, CONTROLS

143 **Muscles For Industry**—Pneumatic power positioners, to provide the "muscles" for thousands of exacting control loads in every industry, are described in this packet of specification sheets, Bulletin TP-MF1. Individual sheets describe performance and construction specifications for standard positioner models, designed for applications where thrust and positioning accuracy requirements are severe—to control flow, pressure, temperature, or level by operating valves, gates, or dampers. Covers positioner cyclinder sizes from 4 by 5 in. to 12 by 48 in. Hagan Corp.

144 **Bronze Meters**—Bulletin OG 409, 8-pp, describes all-bronze Rotocycle meters for metering alcohols, brine, water, ketones, organic esters, some mild acids, sugar solutions, others. Covers bulk-type and other models. Accessories, including remote registration systems for one-man metering control, reading registers, strainers, air eliminators, register extensions, temperature compensators, impulse contactors, and adapters, are also described. Meter and Valve Div., Rockwell Mfg. Co.

145 **Measuring Instruments**—Twelve-pp Bulletin 806 small-size receivers and draft, pressure and temperature gages said to give excellent readability and accuracy with a scale measuring only five in. high. Points out advantages and describes installation procedure, also shows clearance and cut-out dimensions. Covers diaphragm, bellows, and helix type gages. Republic Flow Meters Co.

146 **D-C Recorder**—Product Specification E12-4, 12-pp, describes a potentiometric receiver recorder and controller for temperature, pH, force and pressure, flow and level, speed, radioactive isotope detection, current, voltage, and power, and d-c sources. Covers design and operation features and includes schematic circuit diagram, performance data, and specifications. Bailey Meter Co.

147 **Strip-Chart Recorders**—Bulletin G-628, 12-pp, describes 6-in. strip-chart recorders for pressure, liquid level, temperature, flow, and mechanical motion. Contains installation drawings showing methods of applying instruments to different variables, as well as photos of various models and their features. Use of recorder as a receiver for remotely generated signals, either pneumatic or electrical, is also described. The Bristol Co.

148 **Service Regulators**—Revised Bulletin 1026, 20-pp, features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 181-182. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

149 **Pneumatic Regulators**—Eight-pp Bulletin H-2 lists company's complete line of precision-made pneumatic regulator equipment including: filter-regulator combinations, filters and regulators, relays, purge assemblies and control panels. Bulletin is illustrated with cross section and dimension drawings, and gives typical applications. Conoflow Corp.

150 **Control Panels**—Automatic controls for filters, water softeners, and various ion exchangers are described in 8-pp Bulletin 4178. Advantages of the steel cubicle method of installing instruments and electrical controls for a water conditioning plant are pointed out. Shows typical assemblies of conventional and graphic type cubicles. The Permutit Co.

151 **Control Relay**—Eight-pp Bulletin PL 7305-PM describes company's line of control relays, designed to occupy minimum panel space, and available in models with from two to 12 poles. Pictures 10 models, gives dimensions, enclosures, features, and data on maintenance and pole conversion from normally-open to normally-closed; and lists literature and template kits available. Clark Controller Co.

152 **Trip Controls**—Catalog 65, 12-pp, covers electric two-hand clutch controls for industrial machines. Everything needed to convert unsafe, fatiguing, manually operated machines into fast, safe, easy power operation is pictured. Includes control boxes, hand switches, foot switches, limit switches and lockout switch, as well as clutch actuating equipment, electric solenoids, air cylinders, air valves and air-lube unit. Micro Switch, Div. of Minneapolis-Honeywell Regulator Co.

153 **Dry Feeder Control**—"Application of Principles of Instrumentation to Liquid and Dry Feeders" is the title of 8-pp Preprint B-I-F-M65, which contains 11 flow-parts diagrams. Purpose of this paper is to provide a basic knowledge of the application of instrument principles to gravimetric feeders, especially function of the controller in its various forms. Omega Machine Co.

154 **Oil-Leak Detector**—Eight-pp Bulletin 80 provides a detailed explanation of the operation of the Paraprobe oil-leak detection system for steam-type fuel-oil heaters. Includes standard specifications, installation diagrams, and method of determining rate of flow of condensate. Davis Engineering Corp.

LIGHTING, COMMUNICATION

155 **Overall Illumination**—Outstanding design and construction features of an overall illumination system are outlined in 6-pp Form 800. Included are mounting and construction details, and instructions for determining correct illumination intensity. A large cut-away installation drawing shows how system is adapted to all ceiling conditions. Coefficient of utilization tables and charts for determining lamp spacings included. Smithcraft Lighting Div.

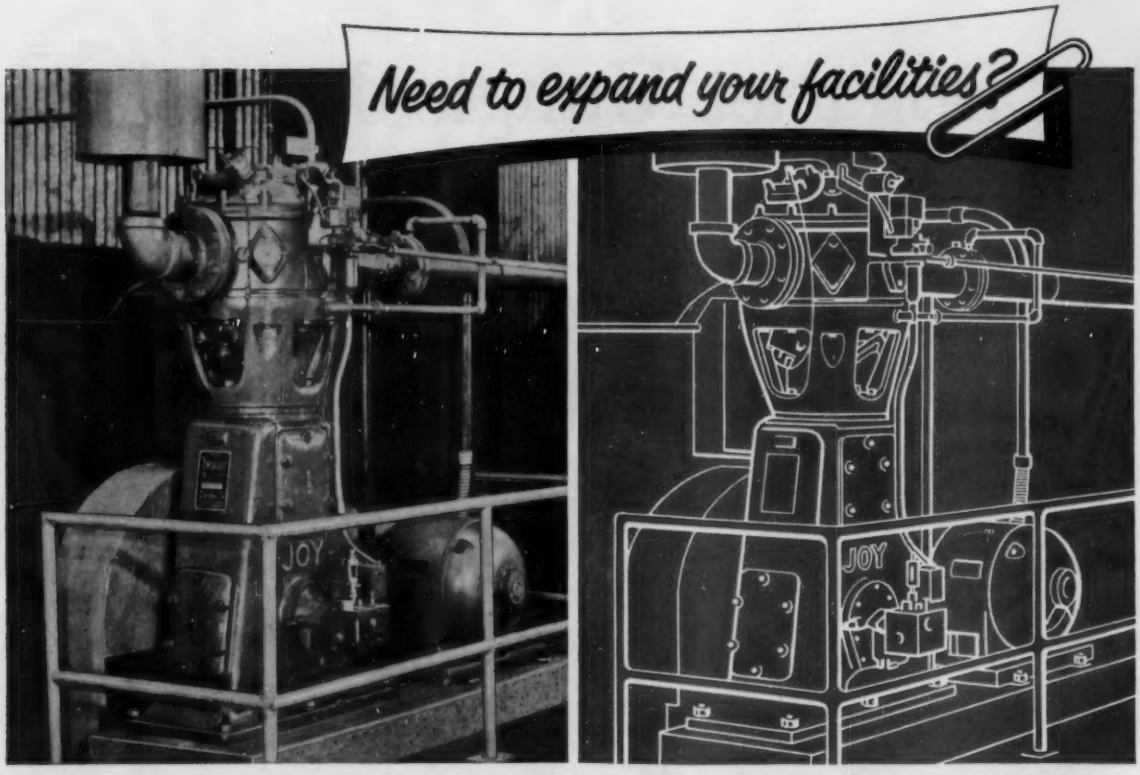
156 **Signal Equipment**—Tips on how to select suitable signals for any specific operation are offered in one of a series of bulletins—Nos. 100-125—found in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

157 **Emergency Lighting**—Form 5736, 8-pp, describes company's line of battery-powered emergency lighting equipment. Diagrams, charts and specifications give essential data on models designed for permanent connection (emergency lighting-unit equipment), auxiliary lighting equipment (plug-in type), and a transparent plastic-cased battery. The Electric Storage Battery Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

159 **Pipe Tools**—This 8-pp revised quick-reference catalog presents recent changes in company's products which include improvements on their 26-R and 28-R threaders; a new lightweight ratchet threader; a remodeled and redesigned high speed portable pipe machine; a power grip chuck; a quadra-type diehead; others. Beaver Pipe Tools, Inc.

(More Bulletins on page 183)



Add compressed air power efficiently with the JOY WG-9

The Joy WG-9 *heavy-duty* vertical air compressor is a natural for supplying additional air for an existing system, either centralized or decentralized.

Because of its smooth running characteristics and the small floor area required, the WG-9 needs only a simple, block-type foundation. The average base dimensions of a larger model WG-9, *including motor,* are 7′1″ by 4′1″. This means greater capacity per square foot of floor area—42 CFM per square foot on the 100 psi rated machines.

Thus, the WG-9 packs large compressor capacity in a small compressor area. It is possible to install the machine in a central compressor room where unused floor space is at a premium, or in a decentralized plant location where crowding of machinery is a problem.

If you have plans for a small plant, the WG-9 is designed to give you continuous 24-hour heavy-duty service. It is also widely used to meet special requirements in larger operations, such as boosting air above standard plant pressures.

The Joy WG-9 is a water-cooled compressor, available in capacity ranges up to 881 CFM piston displacement and in pressures up to 150 psi. Standard drive is multiple V-belt. This machine can be furnished for flat belt or vee flat drive if desired.

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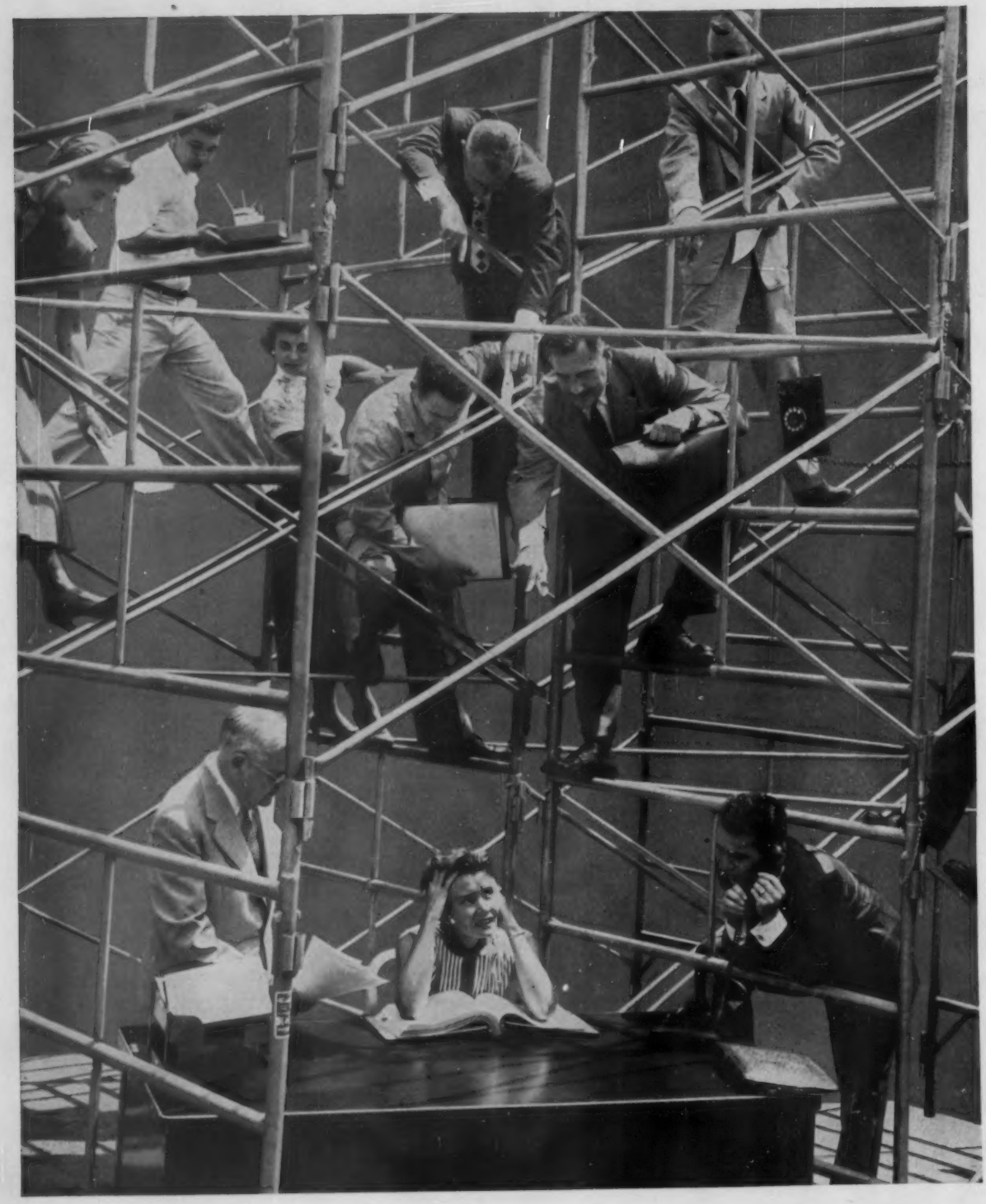
For more facts circle 516 on Reply Card

Don't let "Jungle Jangle" sap



your employees' efficiency!

Tests show work output rises as much as 30% with installation of VMP MOBILWALLS

Don't let noise, confusion, and unchanneled traffic take their toll in the productivity of your plant or office. Don't let "Jungle Gym" distractions cause repeated errors, delays, lost motion—low work output.

Smartly styled, easily installed VMP MOBILWALLS are the logical solution. They partition your plant or office into livable working areas, give your employees productive privacy. They can increase work output and bring you important savings, as proved by *ratio-delay studies** made before and after installation of VMP MOBILWALLS.

Recent studies of firms who installed VMP MOBILWALLS show—

- Productivity increased as much as 30%
- Delays and lost motion reduced as much as 58%
- Time devoted to distractions and correction of resulting errors reduced as much as 55%
- VMP MOBILWALLS added as much to the work output as could have been added by a 30% increase in employees and payroll!

**Ratio-delay studies* accurately rate operating efficiency. Typical studies showing how VMP MOBILWALLS increase productivity are available on request.

PRODUCTIVE PRIVACY is provided by VMP MOBILWALLS in your office or plant. You can easily move MOBILWALLS anywhere, any time, to suit floor plan changes. Surfaces never chip, warp, or crack—wash clean with soap and water. Colors are scientifically selected to produce a pleasant working atmosphere.

SPEEDY INSTALLATION, without interruption in working routine, is made in a few hours by trained local crews. Modern MOBILWALLS, designed by specialists in metal partitioning, are a tasteful blend of function and good looks. They make a major contribution to efficiency and attractiveness wherever installed.

Better check into VMP MOBILWALLS today. Write to Dept. PE-12 for complete, illustrated literature.

Virginia Metal Products, inc.

ORANGE, VIRGINIA

Subsidiary of Chesapeake Industries, Inc.

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"For many years we have used LUBRIPLATE Lubricants for shop assembly, and have recommended them to our customers through your LUBRIPLATE Tag Plan. Our experience shows that if the proper lubricants are used from the beginning, there are fewer problems and parts replacements later. We consider LUBRIPLATE to be the best possible ounce of prevention."—
H. G. Warrington, Vice-Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

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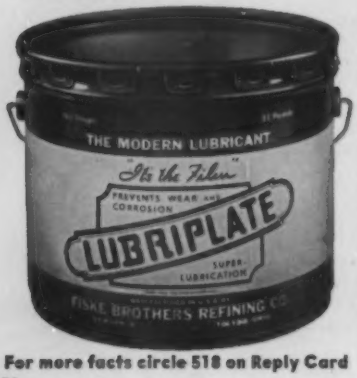

For more facts circle 518 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Plant Engineering Conference

PLANT ENGINEERING:

"Would you please advise at your earliest convenience the date and location for this winter's Plant Maintenance and Engineering Convention and Exposition.

"If our plant work schedule permits, I would like very much to attend this meeting and would like to know as soon as possible the details of date and location so that appropriate plans may be made." *C. C. Huber, Plant Engineer, Armstrong Cork Co., Jackson, Miss.*

▶ The Plant Maintenance and Engineering Show and Conference will be held at Convention Hall, Philadelphia, from January 23 to 26, 1956. Advance registration cards are available and may be obtained by marking "Registration Cards" on postage-paid cards in this issue.—*Editors.*

Maintenance Tool

PLANT ENGINEERING:

"I have an inquiry from one of our executives regarding 'Black Light.' I understand that an interesting article on this subject appeared in your April, 1955 issue.

"We would appreciate receiving a copy of this article for our files." *William Egan, Purchasing Agent, Architectural Tiling Co., Inc., Keyport, New Jersey.*

Pipe Sizing Charts

PLANT ENGINEERING:

"Mr. Stan Colman, sales engineer for the H. B. Smith Co., showed me a copy of the pipe sizing chart which was reprinted from the October, 1953 issue of PLANT ENGINEERING.

"It is the finest and clearest chart of this type I have ever seen and I would be pleased to receive a copy, if available." *Thomas F. Dowling, Torrington Supply Co., Inc., Waterbury, Connecticut.*

▶ We are pleased to send you a copy of the reprint "Quick and Accurate Pipe Sizing Charts" with the compliments of the editorial department.—*Editors.*

Query on Photocopy Paper

PLANT ENGINEERING:

"The August, 1955 issue of PLANT ENGINEERING has an article entitled 'Transparent Photocopy Papers Cut Duplicating Costs.' The article, appearing in the Operation and Production section, describes a translucent photocopy paper which can be exposed in a photostat camera and then can be used to make ordinary prints at much less cost than equivalent photostat copies.

"We have tried using two different photostat papers in this same way. The prints were fairly good, but we had a lot of trouble with the special photostat paper as it was so slick that the feeding device would not work properly. For this reason we discontinued the use of the paper.

"We would appreciate it very much if you could give us the address of Peerless Photo Products, Inc., so that we can obtain more information on the special paper and perhaps try a sample roll of it." *M. C. Lorenzen, Chief Engineer, The Texas Co., Lockport, Illinois.*

▶ Peerless Photo Products, Inc., is located in Shoreham, Long Island, New York.—*Editors.*

Care of Drills, Grinders

PLANT ENGINEERING:

"We are interested in obtaining information regarding the maintenance and care of drills, grinders and sanders used in the fiber glass industry. We are especially interested in what steps can be taken to protect the equipment or in any special design of tools that may be used.

"We would greatly appreciate it if you could tell us the names of persons or companies we could contact." *Glenn A. Gunst, Plant Engineer, Fairchild Guided Missiles Division, Fairchild Engine and Airplane Corp., Wyandanch, L. I., N. Y.*

▶ For information on grinders and sanders, we would suggest that you get in touch with Mr. Dirk Olton, Products Engineering Department, Behr-Manning Div., Norton Manufacturing Co., Troy, New York, and Mr. Roger N. Perry, Jr., Norton Co., Worcester 6, Massachusetts. For information on drills, it might be well to contact the manufacturers for complete data on the maintenance and care of their products.—*Editors.*

Plastic Problem Solution

PLANT ENGINEERING:

"We were particularly interested in the article starting on page 118 of the October, 1955 issue of PLANT ENGINEERING, 'Plastics Problems Pester Plant Engineers.'

"A question raised in that article and also in the second of your editorial notes on page 2 of the same issue, was that of releasing molding sand from steel dies used in the manufacture of roofing tile.

"In addition to the possible solution you mentioned, we would recommend to this manufacturer the use of our Liquid Tile coating." *Albert Tipper, Ev-R-Shield Products Inc., Joppa, Md.*

Servicing Pipelines, Wells

PLANT ENGINEERING:

"At the present time we have a problem with a deep well that is used to

BETZ • *A Great Name In Water Conditioning*

Consulting is a full time job, too!

In our continuing efforts to engineer sound water conditioning for industry, our service activities extend into many phases of this exacting field.

The Betz Consulting Division, for example, is typical of the completeness and diversification of the service we offer.

This separate unit of the organization, staffed with qualified chemical, mechanical and sanitary engineers, provides full-scale engineering services on a variety of problems relating to the *external* conditioning of industrial water for process, cooling, and boiler feed requirements, and the treatment of industrial waste and sewage.

Whether the water or waste problem is of broad or limited scope, the Betz Consulting Division matches *service* to *need* through its many activities such as

. . . economic and technical surveys . . . chemical engineering research . . . pilot plant design and operation . . . equipment specification and procurement . . . process design and supervision . . . start up operation . . . continuous supervisory service.

This specialized consulting service is *another* reason why Betz continues its leadership in providing completely-integrated engineering on all water problems.

Ask a Betz District Engineer the next time he calls how Betz Consulting Service can help you solve *your* water problem. He'll be happy to provide the details.

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BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

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...and dares you to damage it.

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Your Roura Self-Dumping Hopper will cut hand-unloading costs at least 50% . . . pay for itself before you know it. Available in sizes from ½ to 2 cubic yards for use with fork or platform lift trucks, mounted on live skids or with malleable or rubber tired casters.

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1413 Woodland Ave., Detroit 11, Michigan

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BACKTALK

supply the bulk of our industrial water.

"I have checked back through several copies but have not found the name of a firm that I felt sure has advertised in your publication, and who does such work as opening up wells and also has a service for cleaning pipe lines. If my memory serves me correctly the name is Dowell. Could you give us information where we might contact this company." *J. B. Mitchell, Works Manager, Morrow Screw and Nut Company, Ltd., Ingersoll, Ontario.*

▶ You are quite right about the Dowell people servicing pipelines, wells, etc. For any specific information, we would suggest you write to S. J. Martinez, Technical Editor, Dowell Inc., Kennedy Building, P.O. Box 536, Tulsa, Oklahoma. We are also sending you several articles from past issues.—*Editors.*

Did Not Need Assistance

PLANT ENGINEERING:

"We are thankful that we do not need the assistance you offer in your letter, but we do wish to tell you that we appreciate and applaud the spirit of helpfulness behind it." *William J. Andres, Plant Engineer, The Autoyre Co., Oakville, Connecticut.*

▶ This was in answer to a letter PLANT ENGINEERING sent to industrial plants that might have been incapacitated by the recent floods in the East. We offered them the facilities of the magazine if they needed repairs, services or equipment not immediateley available locally. We are happy to state that many of the respondents were not in need of this service as is evidenced by the above letter.—*Editors.*

Paging Mr. Margo

PLANT ENGINEERING:

"In your September, 1955 issue there was an article 'Maintenance Costs—Do You Know When They're Excessive?' by Mr. B. A. Margo.

"We are interested in locating him, but unfortunately he is not listed in the telephone directory of Quebec City.

"We will appreciate it very much if you would be kind enough to advise us where we can locate him." *A. Bishop, Accessories Manufacturers Limited, Montreal, Canada.*

▶ You will be able to get in touch with Mr. Margo at 1235 Latour Street, St. Laurent, P. Q., Canada.—*Editors.*

Electrostatic Lab Test Unit

PLANT ENGINEERING:

"I read with great interest the article on 'Coronatron Electrostatic Separator' in your September issue and would like to have additional information regarding this unit.

"In our plant we have the problem of eliminating contaminating elements in carbon particles in the size range between 20 and 35 mesh. Is there a laboratory test unit available in which samples of this type of material may be tested to see if satisfactory separation can be obtained?" *E. D. Burton, Plant Manager, Electrode Division, Niagara Falls, Great Lakes Carbon Corp., Niagara Falls, N.Y.*

▶ We have notified Mr. E. B. Savage, Jr., of Savage-Lewis, Inc., 1807 Lyndale Avenue, South, Minneapolis 5, Minnesota, of your interest in locating a test unit. Mr. J. E. Ake has done a great deal of work with the research of this equipment and also has a lab test unit at Akron. It might be well to contact him. He is Assistant Manager in Charge of Electrostatic Div., The Quaker Oats Co., Mechanical Research Dept., Mohawk Bldg., 205 Water St., Akron 8, Ohio.—*Editors.*

Winter in July

PLANT ENGINEERING:

"I have stumbled across something which may change your editorial policy:

"Last October (1954) you ran a page story on our re-usable partitions. Nothing much came of it, inquiry-wise, until this summer. So far, we have had four inquiries in about two months.

"My only conclusion is that it takes plant engineers about 10 months to catch up on their reading. I asked my old boss in the engineering department if that was about par for the course. However, it only takes half that time for him.

"Therefore, perhaps you should plan to run your air conditioning stories in October and snow removal stories in April. By the time your readers get caught up on their reading the articles will be in season." *Robert N. Perry, Jr., Public Relations Department, Norton Co., Worcester, Massachusetts.*

▶ We appreciate Mr. Perry's observations and suggestion for rearranging our editorial policy. Would readers like to see a snow clearing article in the May issue or an air-conditioning article in the October issue?—*Editors.*

Piping Color Code

PLANT ENGINEERING:

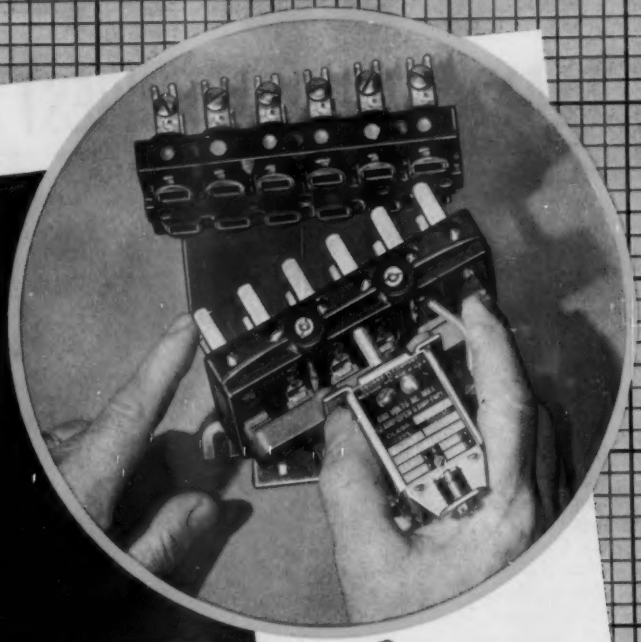
"In the Backtalk section of the October, 1955 issue you briefly discuss color code piping systems and indicate that you are in a position to furnish tear sheets of 'GM's New Piping Color Code.'

"We would appreciate receiving a set of these tear sheets and any additional information you might have concerning the ASME Scheme for Identification of Piping Systems." *C. E. Miller, Assistant Purchasing Agent, Dodge Manufacturing Corp., Mishawaka, Indiana.*

▶ We are sending you tear sheets of this article which appeared in our August, 1954 issue. A copy of the ASME Scheme for Identification of Piping Systems, may be obtained by sending your request, along with 60 cents, to: American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.—*Editors.*

For more facts circle 521 on Reply Card

Now... PLUG-IN RELAY FOR INDUSTRIAL SERVICE!



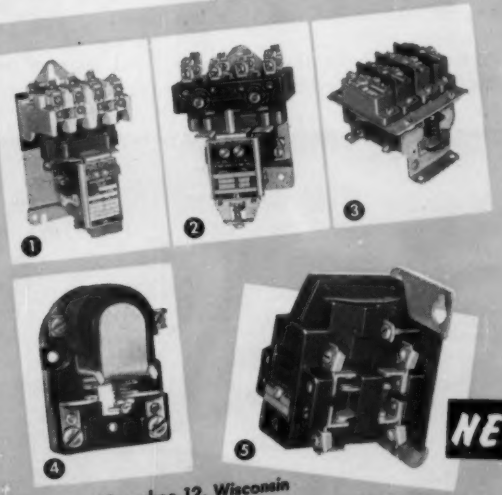
Qwik Change

• A screwdriver and five seconds are all you need to remove this new **PLUG-IN** relay for normal inspection, maintenance or replacement! That's big news in these days of "pushbutton" operations when even a few minutes of down-time can mean thousands of production dollars down the drain.

Square D Field Engineers have sensed this ever-increasing problem in their contacts with machine tool builders and industrial plants throughout the country. Square D design engineers have followed through with this, the first **plug-in** relay built specifically for machine tool use. Another example of design leadership!

HERE ARE OTHER MEMBERS OF SQUARE D's RELAY TEAM

1. **TYPE B** (15 Amperes, 600 Volts) Heavy-duty construction with hardened parts for severe machine tool service
2. **TYPE A** (10 Amperes, 600 Volts) Designed for general-purpose applications involving normal operations
3. **TYPE P** (Rated 10 Amperes, 600 Volts) Totally-enclosed contacts make this type especially suitable for operations in dusty or linty locations
4. **TYPE C** Used as auxiliary devices for controlling small, single phase motors or other light loads
5. **TYPE D** (Rated 10 Amperes, 600 Volts) This new and most compact of all Square D relays is ideal for general-purpose applications involving very limited space



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Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin

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SQUARE D COMPANY

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

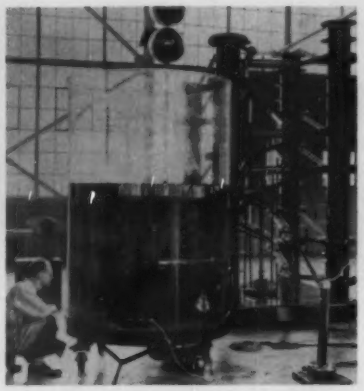
Peek-A-Boo Test Tank

IN SUBJECTING prototype transformer coils to breakdown tests, the laboratory at Packard Electric Co., Ltd., St. Catherines, Ontario, had used a conventional steel vessel to hold the transformer oil in which the coils must be submerged.

Limited visibility of this arrangement made it difficult to detect exactly where and how breakdown of the coils was occurring. Equally important, it was almost impossible to observe failure the moment it began to develop. Thus the testers were frequently unable to determine the exact voltage which caused breakdown.

After investigating acrylic plastic for its dielectric properties and virtually total resistance to the oils used as dielectric and coolant, Packard engineers had a tank fabricated from clear, ½-in. thick Plexiglas sheet.

The tank was made by heat-forming two sheets of the plastic material into a cylinder 5 ft diam, and 8 ft high. The bottom and the side seams were butted and supported by reinforcing strips of the same plastic, then solvent-cemented to form tight joints. A circular steel base, mounted on casters and fitted with a handle, was fabricated for the tank.



Test tank of clear plastic permits engineers to watch, from any angle, breakdown of prototype transformer coils

When in use, 800 gal of transformer oil are pumped into the tank, filling it to slightly more than half its capacity. Leads are introduced through the open top. Typical test currents imposed are 3000 kv at 60 cycles for one minute, and impulse voltages up to 750 kv. *From a release for Rohm & Haas Company, Philadelphia, Pa.*

Liquid-Solids Mix Control

AMOUNT OF water added to the clay, feldspar and flint mix, used in the manufacture of vitreous china for plumbing fixtures, is critical, since the specific gravity of the final mix is used for control purposes.

With products such as basins and

(Continued on page 32)

Conveyorized Receiving Department Distributes Incoming Material On the Double

INSTALLATION of a conveyor system in receiving department has cut delivery delays as much as 75 per cent and saved, in materials handling labor alone, the cost of the system in less than a year.

Previously, processing packages through receiving operations could involve days. One package might be handled as many as six times under the old system.

After making a survey, our engineering department designed a conveyor layout which would speed up and improve the method of handling deliveries. Instead of days, receiving operations now can be accomplished in 24 hours or less from the time that packages arrive at the unloading dock.

Packages enter plant area via conveyor. System speeds delivery by 75 per cent

Deliveries are made directly onto portable, telescopic-type roller conveyors which serve as live storage. Packages are opened, packing slips removed and attached to the purchase order. Then the package is sent to a checking table to determine whether it contains the material specified in the purchase order.

The lead checker has direct control over the outside conveyor and can start or stop it to insure a smooth flow of incoming packages.

Materials destined for manufacturing and clerical activities, such as tools, stationery supplies and the like, are then separated and loaded directly onto truck trailers and delivered to the proper storerooms.

Materials and parts for aircraft require a more rigorous inspection and are placed on an overhead conveyor for delivery to inspection benches.

Packages and parts too bulky for the conveyors are stored on either side of the conveyor area, with direct access to the receiving dock. All aisles are clear for passage of men and trucks in any direction. *From Chance Vought News, published by Chance Vought Aircraft, Inc., Dallas, Texas.*

New Money-Saving Airpower Anywhere in the Plant

Compact... Lightweight... Air Cooled

Le Roi Stationary Compressors are easily installed... anywhere

Take full advantage of every space in your plant where the economies of airpower can increase production and lower costs. How? By using Le Roi's two-stage, air-cooled stationary compressors that require a minimum of space, and are easy to install.

They're compact and lightweight. Moreover, these Le Roi compressors require no cooling water, eliminating the need for expensive space-eating pipes. There's no danger of freeze-ups or overheating from lack of liquid coolants. Only minimum attention by an operator is needed.

The new three cylinder 50S2, and six cylinder 75S2 and 100S2 compressors are balance-designed, reducing vibration and noise to a minimum. Available in 50, 75, and 100-hp sizes producing 210, 340, and 450-cfm capacities at 125 lbs. pressure, these new Le Roi airpower units offer low-cost operation, low-cost installation, and low-cost maintenance advantages for a wide range of needs.

For years Westinghouse compressors were the national favorite in the ½ to 40-hp size range. With the three new Le Roi sizes, an even greater range of dependable airpower is yours — up to 100 hp.

Write today for complete literature describing Le Roi's dependable, low-cost air supply.

LE ROI Division of Westinghouse Air Brake Co.

MILWAUKEE 1, WISCONSIN

Distributors in all principal cities

For more facts circle 522 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

bowls with internally molded drains, the amount of water in the mix, or slip, controls the size of these drains. The slip is poured into plaster molds which absorb the water and as a result, the clay next to the plaster solidifies. The desired clay thickness, and hence the size of the drain, is determined by the length of time that the liquid slip remains in the molds, excess being poured out.

Up to a few years ago, this mixing process at Abingdon Potteries, Inc., was a manual one and subject to error, since the operator would occasionally forget to shut off the water at the correct time.

A batch measuring tank was installed, but this was still not entirely satisfactory, since the operator had to stand by while the water was poured into the mix.

An electricontact meter, connected to an electrical switch so that it measures the required volume of water to any of three mixing tanks, has solved the problem.

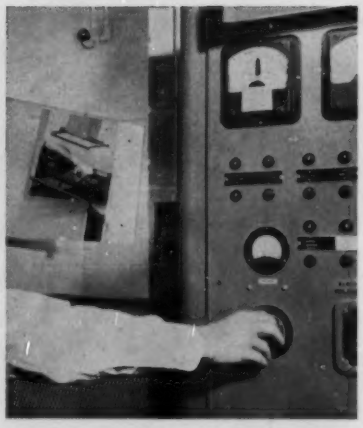
The selector switch controls three, snap-action closing solenoid valves, one on each tank, and the electricontact meter. The meter is 1¼-in. pipe size, but is bushed down to ¾ in. to accommodate the solenoid valves. An air cushion expansion chamber is used to eliminate the possibility of water hammer caused by the rapid closing of the solenoid valves.

Except for routine flushing with cold water every two weeks, no other maintenance has been required during the several years the meter has been in use. The control system has speeded up the operation and removed a source of error. *From Metrol, published by Metrol Company, Detroit, Michigan.*

Irradiation Makes "New" Plastic

UNTIL RECENTLY, molecules in plastics had been cross-linked by chemical means, in a similar manner to which rubber is vulcanized. As a result of this method, chemical impurities were left in the finished product.

With the irradiation process, polyethylene molecules can be cross-linked at room temperature without the use of chemicals. This process is expected to extend applications of the plastic.



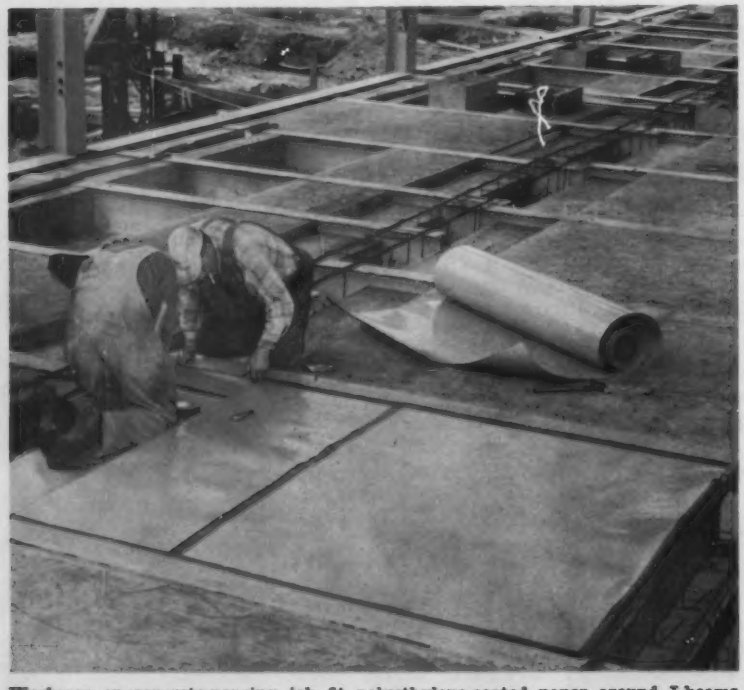
One million volt electron beam irradiates polyethylene, makes "new" plastic on equipment reflected in the mirror

Basically, the irradiation consists of bombarding polyethylene with a beam of high-energy electrons having one million volts peak energy. Although the exact mechanism by which the cross-linking is accomplished is a mat-

(Continued on page 35)

Concrete Pouring with Plastic-Coated Paper and Tape Makes for Smooth Job

CONCRETE with a hard surface, free of fins and smooth enough to paint without further preparation, can now be produced by lining the wooden forms used with polyethylene-coated paper and pressure sensitive tape.



Workmen on concrete-pouring job fit polyethylene-coated paper around I-beams and reinforced rods. Coated paper, tape give hard-surfaced, fin-free concrete

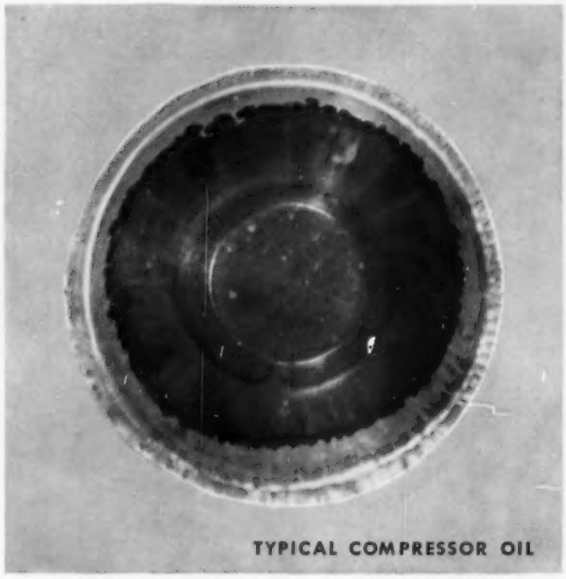
Two problems encountered in the use of wooden forms for concrete pouring are the rough-grained surface, transferred from the wood itself, which must be smoothed and finished before any decorating can be done on the concrete; and that of fins, caused by seepage of the concrete through joints and cracks. Their removal is a costly and time-consuming job.

In lining the forms, the plastic side of the paper and tape should be placed against the concrete. The paper must be firmly anchored to prevent waves or ripples on the surface.

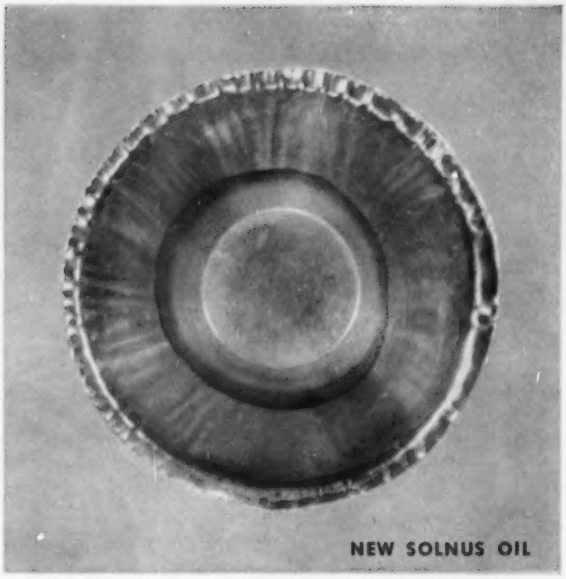
The polyethylene coating forms a moisture-vapor barrier which extends the curing time of the covered concrete, thus giving it a harder surface than is obtained by pouring with other methods. The paper should stay on the concrete for several weeks after removal of the wooden forms.

The smooth surface obtained by pouring the concrete in the paper-lined forms makes it useful for hydraulic work, pipes, flumes and spillways. The concrete has a low coefficient for greater through put and it is smooth enough to promote scouring of particles. *From Permacel Review, published by Permacel Tape Corporation, New Brunswick, N. J.*

For more facts circle 523 on Reply Card——→



To demonstrate the comparative deposit-forming tendencies of compressor oils, two drops of a typical compressor oil were heated until evaporated. Notice the large deposit, *most of which is carbon*, left by the typical compressor oil. A new Solnus oil, after the same evaporation test, leaves a much smaller deposit.



NEW SOLNUS OILS HELP KEEP COMPRESSORS CARBON-FREE

THREE MINUTE TEST right at your desk shows why Solnus oils are the best for your compressors.

The chief enemy of air compressors is carbon build-up. The best way to avoid this hazard is to use the compressor oil that has the lowest carbon-forming tendency.

Sun's new Solnus oils have been proved to be ideal compressor lubricants. The minute amounts of carbon that form are fluffy and blow away easily . . . assurance against dangerous build-up of carbon on valves and exhaust ports. Tear-downs for cleaning are kept to a minimum.

We'd like to show you, right on your desk top, the dramatic test pictured above. Ask your Sun representative about it the next time he calls or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. SI.

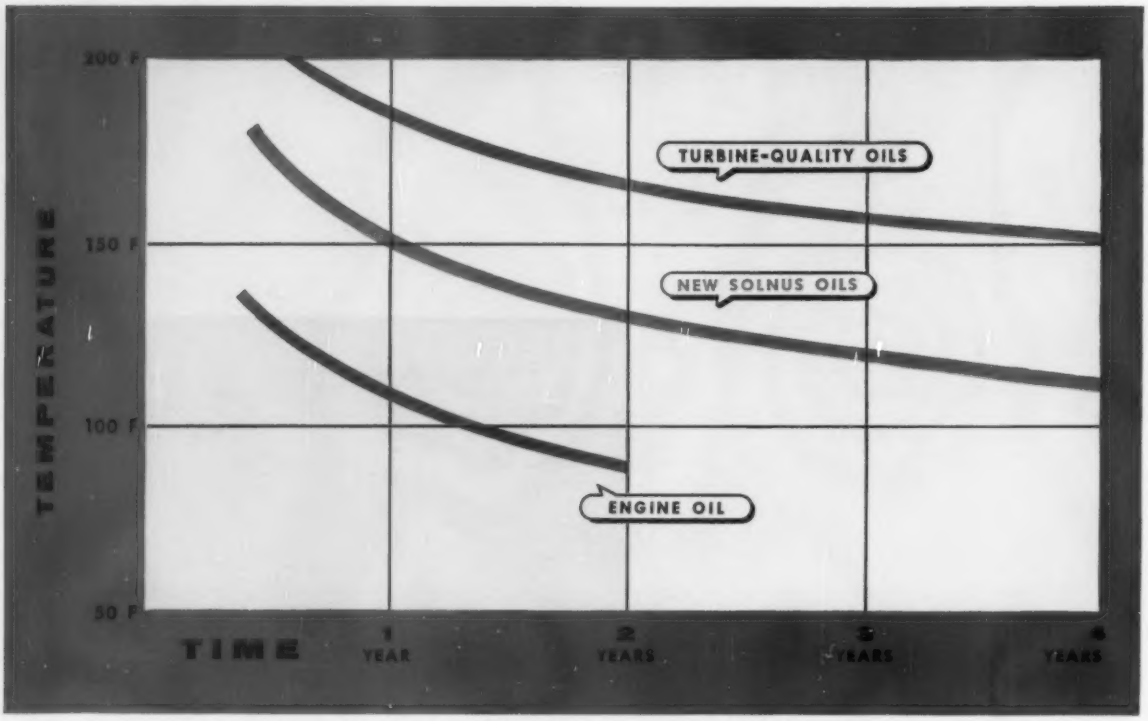
Please turn to the next page

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



This graph is based on 10% make-up per year and a 40-hour week.
The yellow area represents approximately 80% of all applications.

NEW SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

High grade lubricants for squirt-can prices . . . New Solnus oils give more lubrication per dollar

The lubricated parts of most machines—our estimate is 80%—operate at temperatures below 130 F and the time between oil changes is less than 2 years. New Solnus oils were specifically developed to meet these operating conditions at the lowest possible cost.

The above graph compares the service life of new Solnus oils with that of an expensive, turbine-quality oil, and an oil of the type old-timers call "engine oil". The service life of the turbine-quality oil is excellent and probably covers 99% of all applications . . . but for a premium price! The engine oil has a very limited life. It cannot be used safely, except for a very short time, at even moderately high operating temperatures, and it gives very little protection against rust and corrosion.

Now look at the service life of new Solnus oils. They easily meet the service requirements of at least 80% of all oil lubrication jobs and they sell for a squirt-can price! In addition, new Solnus oils are fortified to prevent both rust and oxidation . . . a feature usually found only in more expensive oils.

For the full story on new Solnus oils, see your Sun representative or write Sun Oil Company, Philadelphia 3, Pa., Dept. SI.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

ter of speculation, the net result is that hydrogen atoms are knocked off the polymer's molecules, leaving active sites at which to form cross ties and a three-dimensional network. Displaced hydrogen evolves as a gas.

Only a small dose of radiation is required for cross-linking polyethylene making it non-melting and insoluble in organic solvents at elevated temperatures.

Irradiation enhances the desirable properties of the plastic, including added protection against electrical overload. The ability to withstand heat and to resist environmental stress cracking, not found in ordinary polyethylene, are characteristics of the plastic after irradiation. For example, tanks lined, for chemical resistance, with the irradiated plastic, could operate at higher than design temperatures without risk of immediate failure. *From GE Review, published by General Electric Co., Schenectady, N. Y.*

Man-Made Fiber Defies Acid

WORK CLOTHING budget at a New Jersey fertilizer plant has been reduced by the use of Orlon—acrylic fiber—fabric for employees' uniforms.

Men complained that their uniforms lasted only two weeks, and asked management to find out if any of the man-made fibers would resist the strong acids with which they worked.

Swatches of various materials were obtained and tested by dunking them in sulphuric acid. After all other fabrics had disintegrated, Orlon remained in good condition.

Uniforms now used by the company are made of Orlon. Average life of each is one year. *From Du Pont Magazine, April-May 1955.*

Business Machines for Concrete Batching

BUSINESS MACHINES using prepunched cards, bearing the necessary specification data, and electronics, are the means of automatically batching cement, aggregates and water at Cleveland Builders Supply Company, Cleveland, Ohio.

The Fairbanks-Morse business system is located on the third floor of the batching plant. A perforated card, to indicate the weights of materials for each specified mix, is inserted into the machine, a button is pressed and the mix is automatically proportioned for

HAMER BLINDS FOOLPROOF SHUT-OFF

chalks up substantial savings $

FOR PIPE LINE COMPANY

Oklahoma Mississippi River Products Line Inc., tank farm manifold at Drumright, Okla., employs a quantity of four different Hamer Line Blind Valves.

HAMER *Visible Shut-off* LINE BLIND VALVES

HAMER *Plug Valves*

Will not stick. Plug adjustment nut makes it easy to open or close valve yet assures positive control of the plug.

Contamination costs money. Preventing it means a healthy savings in both time and dollars. That's where Hamer Line Blinds excel. For example: Installed in Oklahoma Mississippi's Drumright, Oklahoma tank farm when it was constructed in 1951, Hamer Blinds have been on the job 24 hours a day providing a quick leakproof shut-off that's both positive and permanent. Net results—the company reports complete product segregation has resulted in substantial savings every year the blinds have been in operation.

Send for FREE Catalog

HAMER VALVES, INC.

2919 Gardenia Ave., Long Beach 6, Calif.

Representatives throughout the World

For more facts circle 525 on Reply Card

20-YEAR-OLD BELT MOVES
4000 CARTONS A DAY AT ENDICOTT-JOHNSON PLANT

Approximately 6500 feet . . . more than a mile . . . of Imperial inner-locked canvas belting is used on 15 conveyors at the Endicott-Johnson Corporation shoe factory.

This company uses so much belting of one brand . . . Imperial . . . because it has found that Imperial Belting gives long-time economy.

The Imperial Standard Rexall Belt shown above (140′ x 16″ x 4 ply) was installed in 1935. Every day it moves approximately 4000 cartons weighing from 15 to 80 pounds each. Another Imperial Standard Rexall Belt (380′ x 16″ x 4 ply) in this plant is still in operation after 29 years, handling 1000 cartons of shoes a day.

Belting made to last longer

Long-wearing qualities are built into Imperial Belts throughout every stage of their manufacture. The base fabric, heavy-duty hard silver duck, has a tensile strength exceeding 750 lbs. per inch of width. This strong material is double-stitched with inner-locking stitches which permanently prevent ply separation, even if threads are cut or broken.

Then the belting is treated with Imperial's exclusive impregnating compounds which waterproof, lubricate, toughen or otherwise condition the belt for a particular type of conveying or elevating service.

Lowest year-after-year cost

The result of this careful manufacturing process is belting that lasts longer and costs less over the years. Write for informative Catalog 54-3. Describe your belting requirements and let our engineers recommend the job-designed Imperial Belt that will perform best and save you money.

You expect more from Imperial and you get more!

Imperial
INNER LOCKED
BELTING
First in stitched canvas belting for over 45 years

Imperial Belting Company
1759 S. Kilbourn Avenue
Chicago 23, Illinois

For new conveyors and elevators, specify and insist on Imperial for lowest ultimate belt cost. Write for Catalog 54-3.

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

Third floor of this plant is location of automatic batching system for concrete

Center of automatic concrete batching operation is business machines system

discharge into the mixer. A meter, which indicates the moisture content of the sand used in the mix, allows the operator to take this factor into consideration when punching the cards.

Two recording charts give positive weight information on every batch of concrete. Only four men are needed for the entire batching operation. *From Dowflakes, published by Dow Chemical Company, Midland, Mich.*

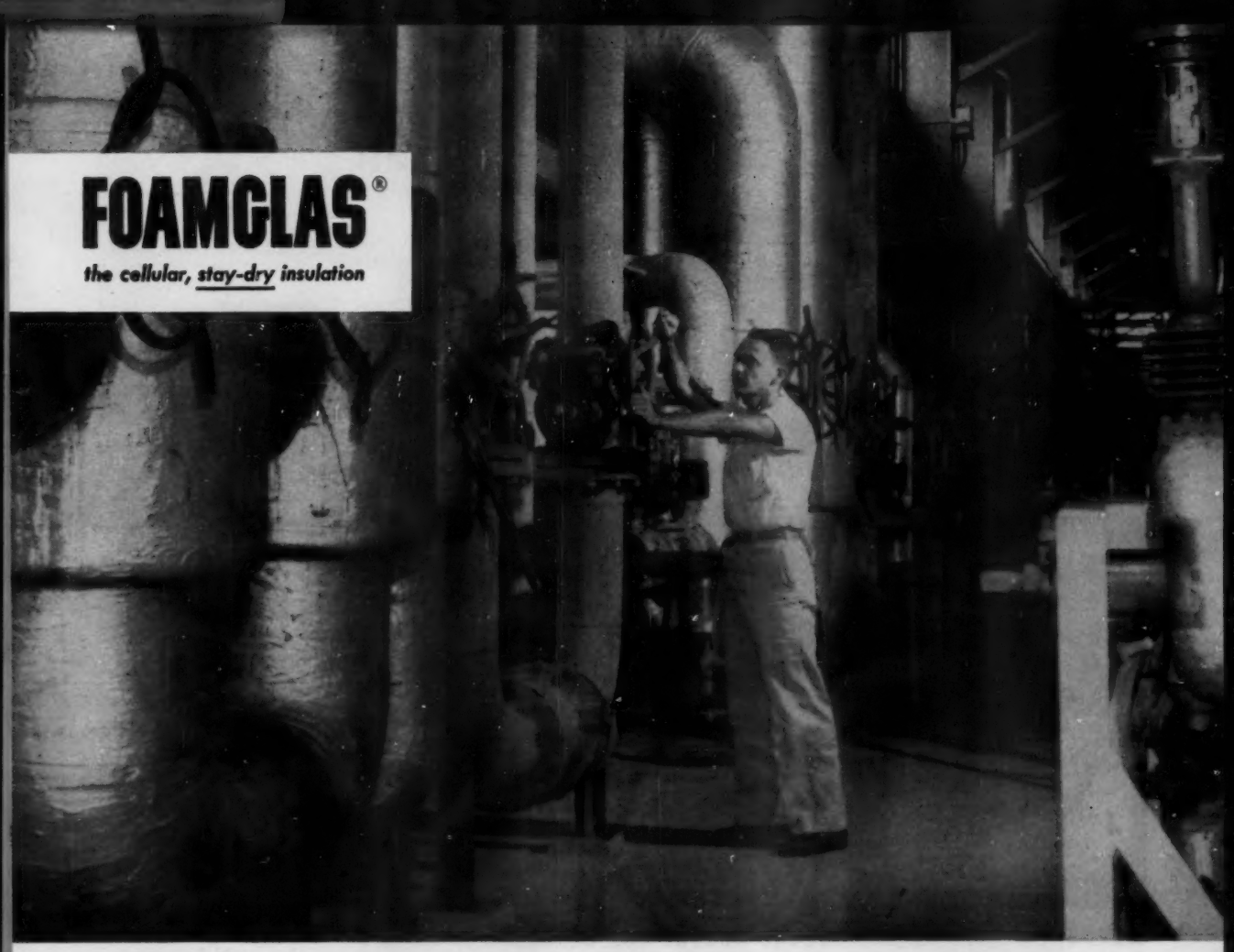
Thumbs Down on Hands

TEMPERATURE of pump bearings are frequently estimated by placing a hand against the bearing housing or shell. The human hand, however, is not an accurate thermometer, and can give a false danger signal. A temperature which feels "hot" varies from 120 F to 130 F depending upon the individ-

For more facts circle 527 on Reply Card ⟶

FOAMGLAS®

the cellular, stay-dry insulation



Lion Oil Co. maintains peak ammonia production because . . .

FOAMGLAS stays dry for constant insulating protection on refrigerated lines and vessels

Production of anhydrous ammonia at Lion Oil Company's Luling, Louisiana Plant requires extensive use of refrigerated lines and vessels. Precise control of temperatures (down to 12°F.) helps hold compressor suction pressure at 25 p.s.i. for peak production. Effective insulation is a must . . . but the area's prevailing high temperatures and humidities pose some tough insulating problems. FOAMGLAS solved them and gave Lion Oil these important benefits:

- The sealed glass cells of FOAMGLAS are unaffected by high humidity. That means *constant* insulating efficiency for dependable temperature control.
- Effective, *stay-dry* insulation prevents condensation on lines and vessels . . . thus cuts costly corrosion.
- Service to equipment is easily accomplished by cutting through the FOAMGLAS, then replacing only the insulation in the area immediately affected.

Recent inspection by Lion engineers showed FOAMGLAS was fully as effective as when originally applied in 1953. Maintenance has been negligible.

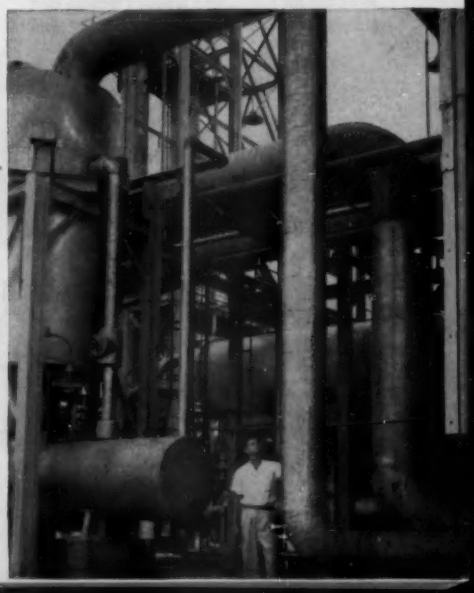
Whether you insulate piping, equipment or buildings, it will pay you to find out more about the *constant, long-lasting* insulating protection of FOAMGLAS. Send today for a sample and literature covering your specific needs.

Pittsburgh Corning Corporation

Dept. PE-125, One Gateway Center
Pittsburgh 22, Pennsylvania

In Canada: 57 Bloor St. W., Toronto, Ontario

Light, rigid, easily shaped and fitted with available tools . . . FOAMGLAS can be swiftly and simply applied to piping and equipment of every size and shape. Insulation Contractor: B & B Engineering and Supply Company, Inc., Houston, Texas.



Visit our Booth No. 1039 at the PLANT ENGINEERING SHOW, Philadelphia, January 23 to 26, 1956

Westinghouse

Has "on-the-job" DEPENDABILITY with

MERCURY

Mercury Platform Lift Truck moving ladle of melt from cupola to pouring station.

MERCURY PLATFORM LIFT TRUCKS ASSURE TOP SERVICE—ELIMINATE UNDUE DELAYS—KEEP DOWNTIME AT MINIMUM

Maximum dependability of equipment is essential when moving 5000 lb. ladles of melt at 2800°F from cupola to pouring stations. Mercury platform lift trucks have successfully met this requirement for over 12 years at the Westinghouse Trafford Foundry.

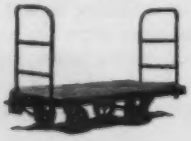
Besides handling over 60% of the Foundry's entire 200 ton daily melt output, Mercury lift trucks and tractors handle and store approximately 50,000 patterns in this foundry, one of the largest and most diversified in the country.

For low-cost material handling equipment, Mercury is your best bet. As originators of the famous "Trackless Train," Mercury tractor and trailer equipment is still considered the "standard" of the industry. For stacking, loading and transporting more tonnage over the long haul, see the Mercury Fork Truck—"Trackless Train" System before you buy.

"Banty" Model A-460 Gas Tractor — 3000 lb. D.B.P.

"Yak" Model A-430 Fork Truck — 4000 lb. capacity.

Model A-310 Trailer — Burden carrier of the "Trackless Train."



A Complete Line of Industrial Trucks—Tractors—Trailers

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

Mercury Material Handling Engineers are located in all major cities of the United States and Canada. Consult the yellow pages of the telephone directory for the one nearest you. Write today for free literature illustrating and describing all Mercury products.

MERCURY MANUFACTURING CO., 4002 SOUTH HALSTED STREET, CHICAGO 9, ILLINOIS

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

ual. Above this temperature the hand is worthless in estimating temperature.

Grease lubricated ball and roller bearings can be operated safely at temperatures up to at least 200 F; upper operating limit on anti-friction bearings is determined by the temperature at which the lubricant fails and begins to carburize; and bearing temperatures up to 160 F are extremely safe. This indicates why a thermometer is necessary to determine bearing temperatures.

Once a stable operating temperature has been established and recorded, it will remain constant until one or more variable changes. A stable temperature, no matter how hot it may feel to the hand, is no indication of danger, as long as it does not exceed the upper limit of the lubricant.

A pronounced increase in temperature is an indication of danger and a signal to investigate. One shot of grease should be added to the bearing, but if this does not reduce the temperature immediately, no more grease should be added. The unit should be checked for unnecessary loads, such as coupling misalignment, or improper packing adjustment.

A temperature increase may not be a sign of impending bearing failure or excessive load, but could be entirely due to an increase in temperature of the liquid being pumped or in the ambient temperature. Heat transfer can be minimized by connection of a quenching gland using cold water from the plant supply line. *From Goulds News, published by Goulds Pumps, Inc., Seneca Falls, N. Y.*

Air Hoist Lifts Conveyor

A 1000-LB air hoist has been adapted for lifting an entire section of floor conveyor at Ideal Dispenser Company, Bloomington, Illinois, to simplify the handling of cooler boxes.

Lifting a section of the conveyor means that the cooler boxes, received crated at the plant, can be put on the conveyor, then raised to a convenient height for uncrating. Afterwards, the conveyor section is lowered and the box continues along the assembly line where the condenser unit and fittings are installed. At the end of the assembly line, the conveyor section is again raised and the box is recrated ready for shipment.

The air hoist was adapted to this lifting job by attaching a sprocket

Announcing New, 30 and 60 Amp.

Arktite

HEAVY DUTY

PLUGS & RECEPTACLES

NEW pressure connectors; no soldering unless you prefer to do it.

NEW easier-to-wire interior assembly; comes out in one piece—just remove 2 screws.

NEW easier-to-interchange plug and receptacle interiors; no machining; no special tools.

NEW plug adaptability; takes any size portable cable up to full 30 or 60 amp. capacity.

Circuit-Breaking Features Make Arktite Safe at Full Load Without Disconnect Switches

Each contact is insulated in a separate chamber. Arcs formed while making or breaking circuit are snuffed out in arcing chambers by pressure-deionization and lack of oxygen. No chance of flash-over even if break is made at full load. With grounding contacts longer than load contacts, plug and tool are grounded *before* circuit is made and *after* it is broken.

New *Arktites* now available in 30 and 60 amp. sizes — 2-pole, 3-pole and 4-pole styles. Fully interchangeable with old *Arktites* — *same economical price.*

SEND FOR FREE BULLETIN

OR SEE YOUR CROUSE-HINDS DISTRIBUTOR.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

CONDULETS • FLOODLIGHTS • TRAFFIC SIGNALS • AIRPORT LIGHTING

For more facts circle 529 on Reply Card

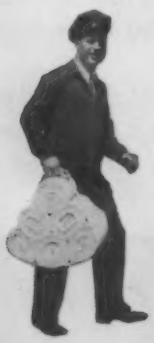
New Orleans Union Passenger Terminal provides COTTON TOWELS for greater passenger comfort

Union Passenger Terminal uses Fairfax towels supplied by Towel and Linen Rental Co., New Orleans, La.

The New Orleans of today is a city of contrasts where old world graciousness and modern business methods come face to face. Typical of this is the newly constructed New Orleans Union Passenger Terminal. Easily the most modern railroad station in the nation today, the Union Passenger Terminal handles the thru trains of 7 different railroad lines efficiently, quickly; yet with special attention to the comfort and well-being of their passengers.

It is no surprise, therefore, to find Fairfax cotton towels in both the staff and public washrooms. And the showers and clean terry bath towels available to travelers are another example of management effort to assure complete passenger comfort. Also from a practical angle the lowered maintenance costs, reduced fire hazard and cleaner, tidier washrooms make good business sense.

Why not give the towel job to cotton in your office building, plant or institution. Write for free booklet which explains how cotton towel service will help you. Fairfax, Dept. P, 65 Worth St., New York 13, N. Y.



Here's How Linen Supply Works...

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Just look up LINEN SUPPLY OR TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels...

Sure Sign of Good Management

Fairfax Towels

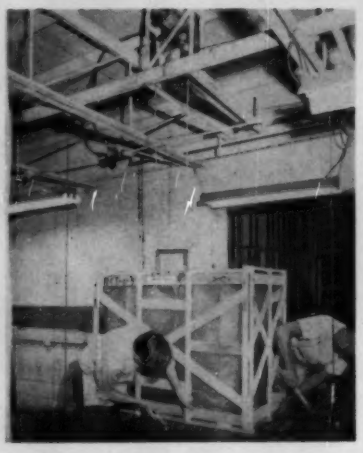
A PRODUCT OF WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)



Lifting conveyor section with air hoist simplifies crating job on cooler boxes

wheel to a horizontal drum. Four lifting cables lead to the corners of the part of the conveyor to be raised and posts guide the conveyor platform. *From Production Ideas, published by Keller Tool Div. of Gardner-Denver, Grand Haven, Mich.*

Reducing Cleaning Costs

CLEANING methods in building and plant maintenance can be improved and costs reduced if management will give proper consideration to this operation.

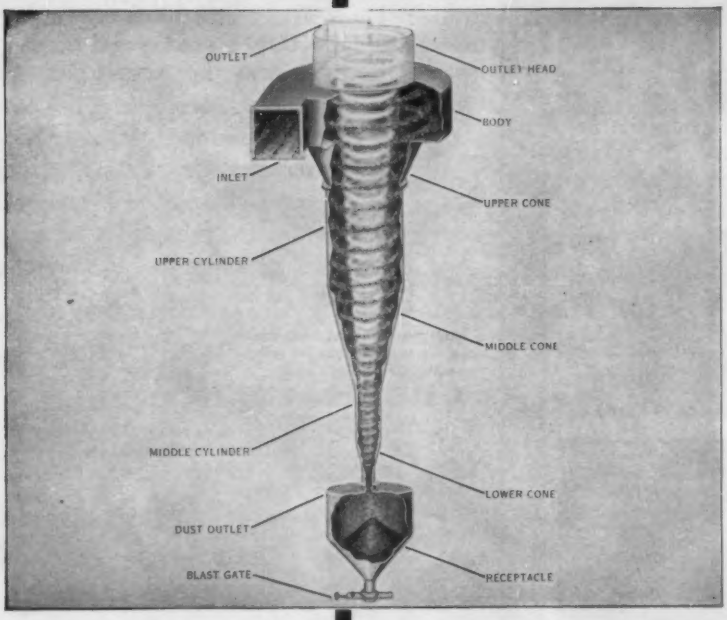
A complete survey of every cleaning operation should be made and charted, and the proper tools and supplies assigned to the maintenance crew. A blue print showing a complete job analysis and work schedule should then be set up.

Push brooms, sweeping mops and brushes of various sizes will speed work. Various types of cleaners and detergents should be chosen according to the type of floor and conditions encountered.

Increased cost of man-power has accelerated the swing toward mechanized cleaning. Power-driven scrubbing, polishing and vacuuming equipment that speeds up work, will usually reduce payroll costs, since labor represents about 95 per cent of the cost figure. Cleaning supplies such as soap, detergents, polishes, mops and brushes account for only about five per cent of overall cleaning maintenance costs. *From a release of the National Sanitary Supply Association, Inc., Chicago, Illinois.*

American Blower Dust Collectors

Recover valuable materials, eliminate nuisances



Mechanical type collectors offer high efficiencies over wide range

Simplicity in principle and design is the key to the efficient operation of American Blower Type D Dust Collectors. There are no rotating parts to adjust or repair. No water, oil or other collecting substances, which might cause corrosion or plugging, are used.

As a result, American Blower high-velocity mechanical collectors are widely used in industry as a means of eliminating a dust nuisance or to recover valuable materials from air.

If you have a problem in dust collection, consult the nearest American Blower Branch Office, or write stating your requirements.

Complete dust laboratory to serve you

Technical information, obtained from thousands of tests in our laboratory and in the field, has provided our engineers with an extensive file on dust problems and covers thousands of dust samples. Engineers are invited to make use of our complete dust-research laboratory where tests can be made on commercial-sized collectors.

American Blower products serve industry

Air Conditioning, Heating, Ventilating Equipment
Mechanical Draft Equipment
Industrial Fans and Blowers
Centrifugal Compressors
Gyrol Fluid Drives
Dust Collectors

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE
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frame it with DEXION!

New "DO-IT-YOURSELF" framing material has scores of applications in your plant

TESTING BENCH

STAIRWAY

WORK BENCH

MAINTENANCE PLATFORM

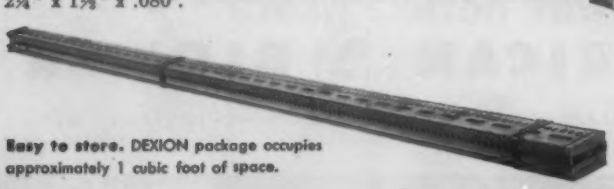
STORAGE BINS

MEZZANINE FLOOR

GOODS CART

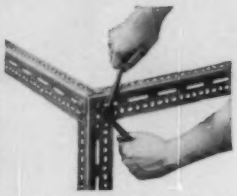
FRAMEWORK CONVEYOR

DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".


Easy to store. DEXION package occupies approximately 1 cubic foot of space.

Here's why you'll want DEXION Slotted Angle over any other framing material

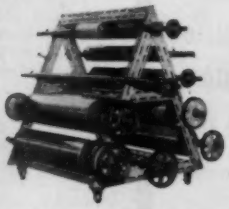
Anyone who can handle a wrench and a saw (or Dexion Cutter) can build with this precision-made, galvanized steel angle. And DEXION is so easy to use or re-use! There's no drilling—no welding—no waste. DEXION is strong and rigid—lasts a lifetime—and the price is amazingly low.


Simple to connect. All you need are two wrenches. No special parts—no training necessary.

Easy to cut. One down-stroke of DEXION cutter saves time and work.

Re-usable. You can dismantle and rebuild into other equipment.

Easy to measure. Diamond-shaped cutting marks spaced 3" apart.


Strong and rigid. Will support many hundreds of pounds.

DEXION panels. Available for shelving to support heavy loads.

You name it—DEXION will frame it!

Get the exciting new DEXION IDEA BROCHURE, which gives you full information—and shows what scores of manufacturers are building with this amazing framing material. Write direct to the address shown below.

DEXION DIVISION

ACME STEEL COMPANY

Dept. 12C, 2840 Archer Avenue,
Chicago 8, Illinois

ACME STEEL

For more facts circle 532 on Reply Card

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d-89

Bremen Bearings, Inc., uses SUPERLA Soluble Oil to give bearings the clean, cool treatment

PRECISION NEEDLE BEARINGS are the exclusive product of Bremen Bearings, Inc., Bremen, Indiana. SUPERLA Soluble Oil is used exclusively in all eight of the Company's Cincinnati Centerless Grinders. Plant management experimented with various soluble oils before settling on SUPERLA. They found none could compare with SUPERLA Soluble Oil with respect to wheel loading, stability and tool machine cleanliness.

Plus these benefits, Bremen found SUPERLA mixed readily with water regardless of degree of hardness. The Company found, too, that they got longer tool life and maximum rust protection of work and machines.

You will have the same experience with SUPERLA Soluble Oil. Find out. Inquire of your Standard Oil lubrication specialist. In the Midwest call your nearby Standard Oil office. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Ill.

STANDARD OIL COMPANY (Indiana)

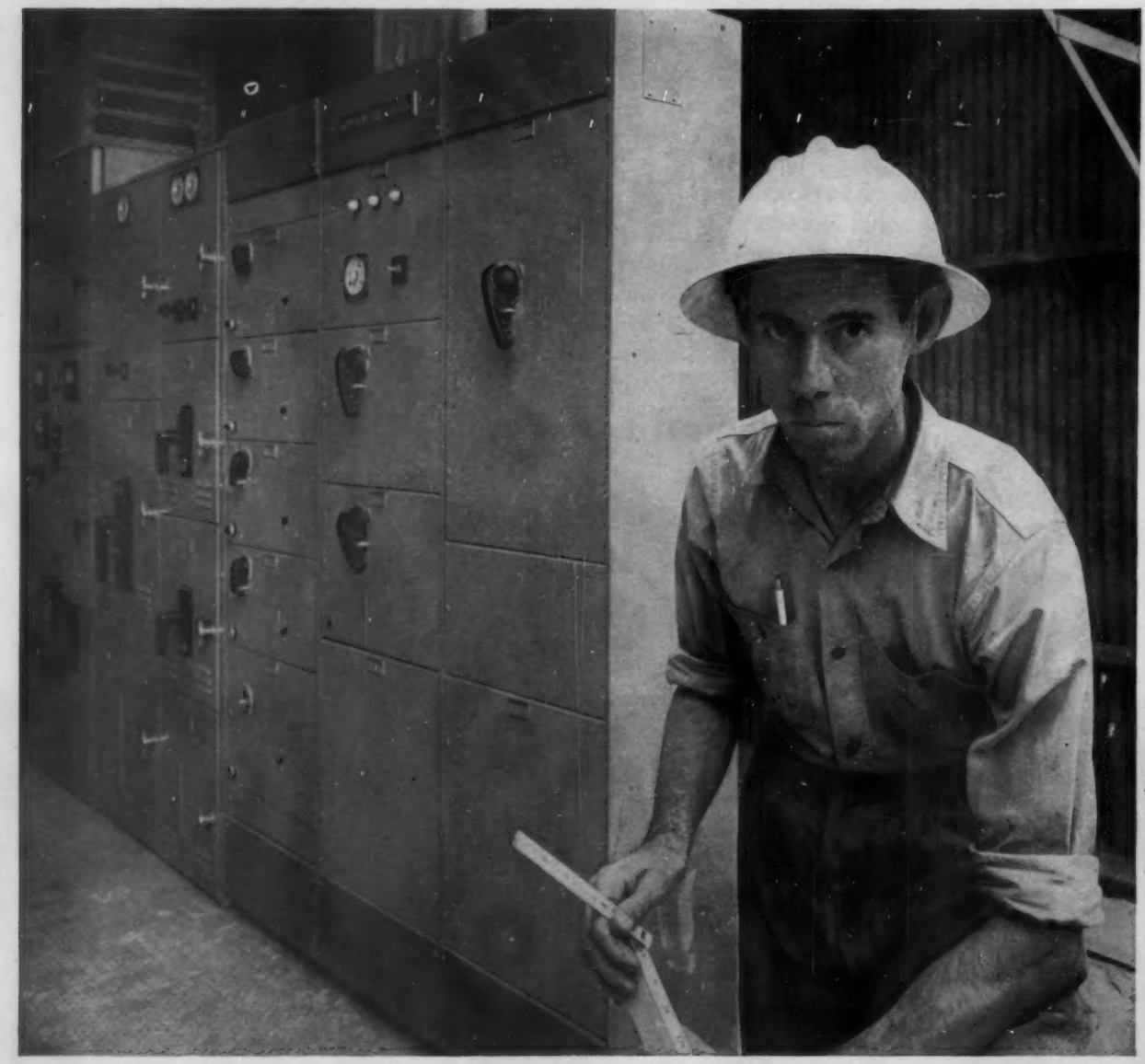
STANDARD

Franklin D. Clark (right), Sales Manager, Bremen Bearings, Inc., and Standard Oil lubrication specialist E. A. Hunt, inspect needle bearing. Gene Hunt is well qualified to assist industrial plants on lubrication problems. In addition to his three years' experience in industrial lubrication sales work, Gene has an M. E. degree from Purdue and has completed the Standard Oil Sales Engineering School. Customers find this experience and training pay off *for them*.

Bearings being ejected from Cincinnati Centerless Grinder at Bremen Bearings, Inc. The Company manufactures needle bearings to customers' specifications in sizes from 1/16 to 1/2 inch with tolerances of .0001" and finishes to 3 micro-inches. SUPERLA Soluble Oil is used on all of the Company's grinders.

Engineer and Contractor tell in their own words how they rate G. E.'s new motor control center

"Nothing in the field could equal this equipment," says plant engineer Henry Roth —"Our job greatly simplified," asserts electrical contractor A. G. Crunkleton.

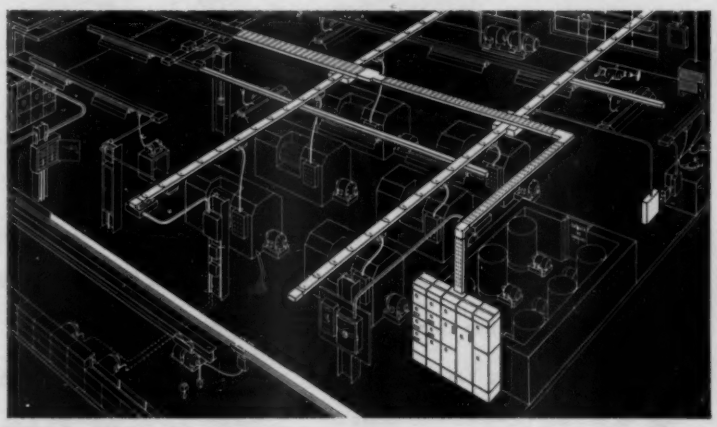


"At the North American Cement Company," says Henry Roth, "we recently replaced some G-E switchgear after 28 years of continuous operation. Having learned to expect this remarkably dependable kind of service from General Electric equipment, we replaced with G.E.'s Type DA7093 Motor Control Center that you see here. Heavy-duty limestone pulverizing like we are doing here at Hagerstown, (Md.) demands equipment that's durable and easily maintained. We can't tolerate even an hour of lost time in our around-the-clock operation, 365 days a year. That's one reason we chose the DA7093. In addition, this G-E design has built-in flexibility. For example, units can be interchanged to accommodate larger motors, and whole sections can be added to handle increased loads. Our new G-E Motor Control Center gives us the reserve capacity and unusual flexibility we'll need to keep pace with the growing and shifting requirements of our plant."

A system to meet both present and anticipated power loads. "Our job was to design and install a system that could withstand their rugged operating conditions and provide flexibility to meet increased future loads," says A. G. Crunkleton, president of Crunkleton Electric Company, Greencastle, Pa. "The General Electric DA7093 Control Center met those requirements and offers maximum protection to motors and circuits in the event of overloads or shorts. Our job has been greatly simplified and improved because, for one thing, the G-E Control Centers are designed for specific customer demands. The guesswork is eliminated. We work very closely with the G-E people, and they factory-fabricate the equipment to my customers' specifications. When I receive it, it's ready for quick and easy installation."

Shutdowns for maintenance practically eliminated. "Our maintenance electricians," says Mr. Roth, "were particularly impressed. Our inherent dusty working conditions have always led to high maintenance on open-type gear, but this situation has now been entirely eliminated because all working parts of the G-E Control Center are sealed off. After conferences with Crunkleton Electric Co. engineers, we all agreed that the G-E Control Center was the best in our particular situation. Nothing in the field could equal these units for day-in, day-out heavy-duty usage like ours." ***Engineered for maximum safety.*** "The DA7093 has already saved the life of one of our men," says Mr. Roth. Mr. Roth adds, "Since all breakers, relays and starters are within the cabinet, workers can't accidentally get into the wrong circuit. In addition, pilot lights and reset buttons are in open view on each door. And two further advantages are that the padlocked-type handle must be in the 'off' position before the door can be opened, and positive isolation is provided between one section and the others."

The Type DA7093 Motor Control Center (shown in layout) is an integral part of G.E.'s secondary distribution system, which also includes switchboards, busway, unit substations and panelboards. This "system engineered" equipment gives user and contractor seven *work-together* advantages— *1. True extendability* because G-E standardized components are especially designed for easy addition or relocation. *2. Easy-to-assemble. 3. No loss when moving.* "System Engineering" provides for practically 100% re-use of materials. *4. Complete relocation of loads* without rewiring. *5. Maximum electrical efficiency* from components designed to work together. *6. One source of supply* for all components. *7. Skilled planning service* from the G-E Engineer who is selling not just components but "System Engineered" equipment to assure installations with a built-in future. **Distribution Assemblies Department, Plainville, Conn.**

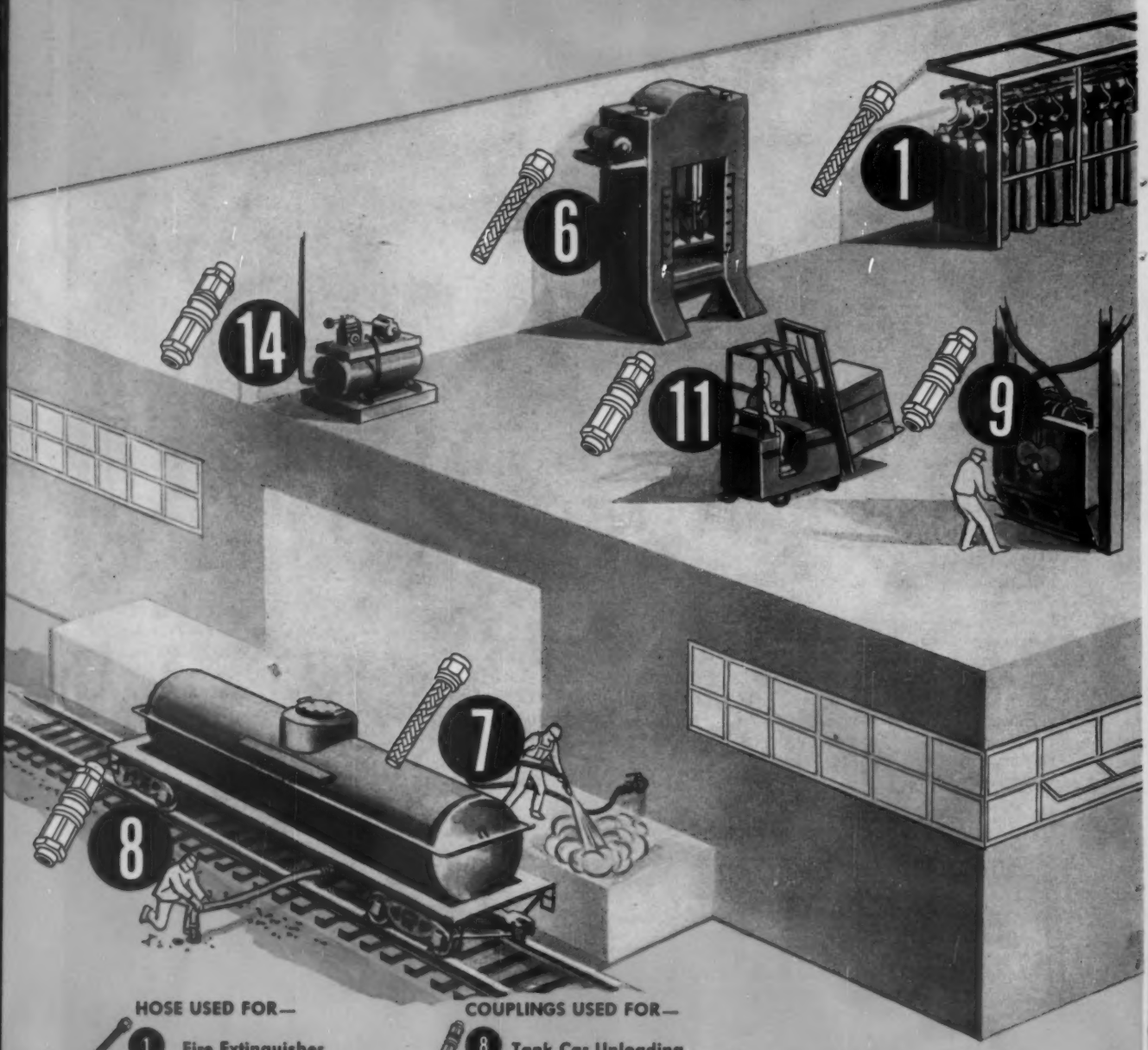


Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 534 on Reply Card

Leakproof couplings and durable metal hose... versatile problem-solvers for any industrial plant



HOSE USED FOR—

1. Fire Extinguisher
2. Air Control Lines
3. Cleaning Vats
4. Air Conditioning Units
5. Milling Machine
6. Hydraulic Press—Lubricating Lines
7. Steam Lines

COUPLINGS USED FOR—

8. Tank Car Unloading
9. Furnace Doors
10. Blending "Switchboards"
11. Lift Trucks—Hydraulic Lines
12. Mobile Testing Equipment
13. Machine Cleaning
14. Air Lines for Tools

Titeflex

TITEFLEX Couplings Metal Hose for any corrosion, temperature, vibration, or pressure problem

Flexible Metal Hose

Quick-Seal Coupling

That's the designation for top-rated TITEFLEX QUICK-SEAL COUPLINGS and FLEXIBLE METAL HOSE. Both are designed to convey gases as well as liquids under severe stresses of temperatures, vibration, pressures, corrosion or . . . *any combination* of these or other common operational problems.

TITEFLEX COUPLINGS AND HOSE save money, time and trouble in an endless variety of industrial applications. Check this schematic drawing for uses which may apply in your plant. One or more of these applications may result in faster, more efficient, cost-saving uses in your plant operation.

Use coupon below for additional information. Your Titeflex representative will be glad to advise you.

QUICK-SEAL COUPLINGS

- *Absolutely* leakproof
- Couple-uncouple in ONE second—*without* tools
- Allow *free* flow
- 360° swivel—no kinking of hose
- Straight-through or single or double check-valve types
- Sizes—¼" to 12"

FLEXIBLE METAL HOSE

- All-metal construction
- Corrosion, vibration resistant
- Braided or unbraided, in many alloys in many sizes or fittings
- Simplifies design and installation problems
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in all industrial plants

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Powered Wire Twister

ELECTRICAL CIRCUITS for aircraft call for specially-twisted wire groups to avoid field interference. To provide them, Martin Aircraft devised a

Circular comb held by operator guides wires being twisted by rotating head

mechanical wire twister, operated by one worker.

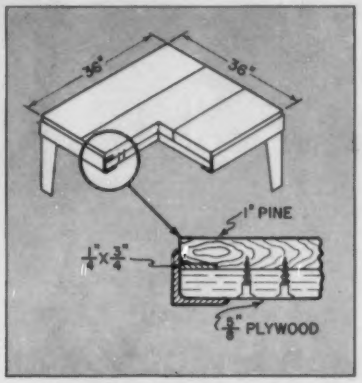
The device consists of a driving head powered by a slow speed motor, a stationary head fitted with rotating pins and a comb for leading the wires as they are being twisted.

One end of each wire to be twisted is attached to the driving head while the other end is fed through the comb and attached to the pins on the stationary head. The operator starts the motor and leads the wires with the comb while walking ahead of the twists. At the end of the run, the twisted wire group is removed.

Plywood Platforms Plenty Strong

TO MOVE MATERIALS around in their plants, the Bonded Abrasives and Electrochemicals Division of the Carborundum Co. uses about 10,000 platform skids. These platforms, each 36 in. by 36 in., and 12 in. high, were all fabricated at the plants.

Two requirements for the platform design presented problems—they had to be picked up from any of the four sides, and also, the product being moved on the platform could not come in contact with any metal that might



Cutaway platform drawing shows construction. Inset shows important details

chip it. This "sensitive" product was bonded abrasive wheels, in various phases of production.

Standard frame design was based on a frame, constructed of ¼ in. by 1½ in. by 1½ in. angle, with a leg fabricated from 10-gage sheet, in each corner. A cupped shoe, welded at the bottom of each leg, provided a smooth surface to prevent the legs from digging into the floor.

Original design called for the use of three lengths of spruce plank to be fitted into the frame, and bolted in place with carriage bolts. The bolt heads were countersunk in the platform, to keep the platform surface clear of projections.

Underneath, however, the protruding bolt threads and nut presented a problem in their vulnerability to damage by a truck as it slid under the platform. Often, the bolt would be pulled entirely through the wood, if it were hit severely.

A design alteration, using a sheet of plywood that fits into the angle iron frame, has resulted in a highly satisfactory platform. The sheet of plywood, 35¼ in. square, is secured in the frame by welding lengths of bar stock above it, along two sides of the frame. Then, three lengths of Brazilian pine, their ends cut out to fit over the bar stock retainers, are laid in place in the frame, over the plywood base. Wood screws, driven up through the plywood into the pine boards, hold them securely in place, with no protruding bolts or nuts to present a "target" for a lift truck.

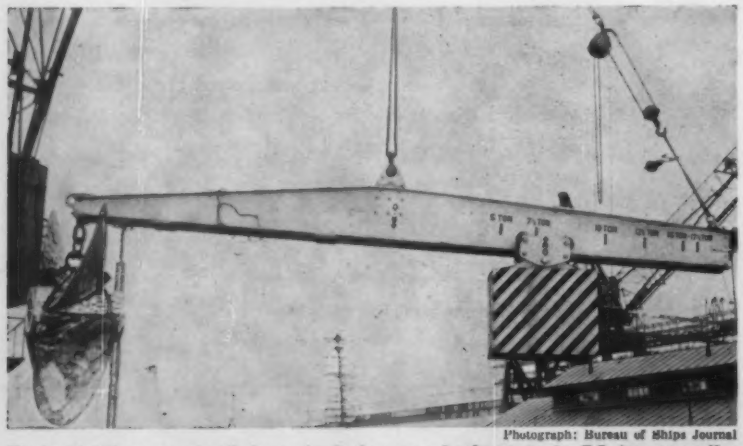
Material costs have been held to very near that of the former design, by using a rough grade of unfinished plywood in the construction. However,

Horizontal Beam Balances Propellers in Naval Drydock

MATERIALS HANDLING equipment that facilitates removal and installation of propellers weighing up to 17 tons is in use at the Norfolk Naval Shipyard.

A fabricated beam, it is supported horizontally at its midpoint by cables from a drydock crane. A movable counterweight mounted on one end of the beam provides flexibility for handling various loads. After a propeller or other load is rigged on one end of the beam, the counterweight is moved along the beam to the point at which its weight will balance the weight of the item being lifted. The beam is marked off at the spaces representing 5, 7.5, 10, 12.5, 15 and 17.5 tons. A screw, controlled by a chain from the dock, moves the counterweight.

An additional benefit of the beam is its availability to provide an additional 15 ft of horizontal reach for the crane on which it is slung.



Photograph: Bureau of Ships Journal

Horizontal beam suspended on drydock crane hook supports 7.5 ton propeller

For more facts circle 536 on Reply Card ——→

ACCO products

WRIGHT Electric Hoists for Top Production, Easiest Maintenance

WRIGHT *Speedway* Electric Hoists—Frame 1, Frame 2 and Frame 3—are ideal **HOISTS** for handling production materials where the load requirements **ARE** from ½ ton to 10 ton capacity. Their design includes many advanced **SAFE** operating features. Sound choice of components provides them with **EFFICIENT** balance for smooth running. Parts are designed and built to give **RUGGED** performance with a minimum of care. Plant operating men find them **ADAPTABLE** to almost every type of shop work because of the wide range of speeds, lifts and mountings.

The more particular you are in your selection of hoisting equipment—the more likely you are to choose WRIGHT

Write our York, Pa., office for any or all of these fully informative bulletins—

Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways

Catalog E-54A on Frame 2 and 3 WRIGHT Speedways

Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

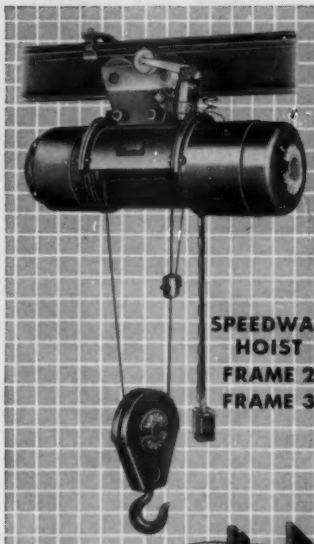
ACCO

Wright Hoist Division

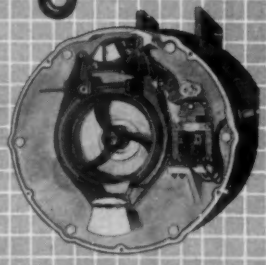
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

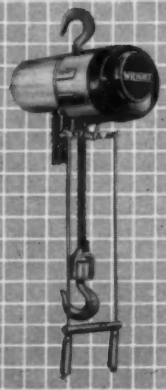
for Better Value



SPEEDWAY HOIST
FRAME 2
FRAME 3



MOTOR BRAKE & SOLENOID
FRAME 2 and FRAME 3 HOIST
"Nothing to adjust but the cam!"



WRIGHT
Electric Roller Chain Hoist

- ¼, ½, 1 and 2-ton capacities
- Fewest number of wearing parts
- Self-locking, double-worm gear acts as own load brake
- Spring-set, shoe-type motor brake, clam shell type
- Oversize precision ball bearings
- Forged steel-alloy hook, swings and swivels

COMPETITIVELY PRICED

THIS DOUBLE-WORM GEAR ELIMINATES TROUBLESOME LOAD BRAKES

SPEEDWAY HOIST
FRAME 1
(also FRAME 1½)

MOTOR BRAKE
FRAME 1 and FRAME 1½
"Nothing to adjust but the cam!"

OPERATION — PRODUCTION

(O and P begins on page 48)

the users feel that any cost differential with the plywood construction is more than offset by the longer service possibilities of the new design.

Electric Drill Powers Hoist

RAISING HEAVY equipment into position in buildings under construction is an operation that a Baltimore, Md. firm has delegated to an electric drill.

The General Elevator Company manufactures and installs elevators for multi-story buildings. Locating the hoisting equipment in position on top of the building has been a problem, and the engineers at General Elevator have devised a system that is working satisfactorily.

A ¾-in. heavy duty Black & Decker drill, with a speed of 275 rpm, was fitted with a six-foot extension attached to its chuck. The other end of the pipe extension was coupled through a universal joint to a chain fall located at the top of the elevator shaft.

With this rig, one man can lift extremely heavy loads up the shaft. General Elevator reports successful hoisting of loads up to 8000 lb. A reversing switch on the drill facilitates easy choice of hoisting or lowering.

Brazing Filler Metal — Wire or Preforms?

TWO METHODS for applying filler metal to a joint when brazing offer the choice of hand feeding the metal into the joint when the assembly reaches brazing temperature, or preplacing the metal in the joint during assembly and then heating the assembly so that the filler metal melts in place. With hand feeding, the metal is introduced from a length of wire or rod; with preplacement, the metal is cut and shaped into a preform to conform to joint contours.

To assist in evaluating the two methods, Handy & Harman, manufacturer of silver alloy filler metals and fluxes for brazing, offer some hints on the practicality of either method in a given situation.

Hand feeding, usually done with hand-torch brazing, is economical when the production rate, the geometry of the part or the size of the joint prevent automatic production. For example, the parts may be so small that preforms would be too delicate to handle, or the shape of the parts may be so irregular that it would be too difficult or wasteful to fabricate the preforms.

Preplacement of the brazing filler metal offers many advantages, provided production volume is high enough to justify the cost of fabricating preforms. It permits choice of heating method, including hand torches, conveyors or rotary tables with fixed burners, induction heaters or furnaces. Accurate control is possible in the quantity of filler metal used per joint. The use of preforms also puts the metal where it is needed, and eliminates the need for skilled operators, by permitting automatic heating methods.

Silver alloy fillers can be preformed into a wide variety of shapes—wire rings, shims or squares of sheet stock, flat washers or discs and coined washers stamped from rings of wire. Before specifying an elaborately shaped preform, however, it is wise to check the use of several lengths of wire laid along the joint to do the same job as the preform.

A few simple precautions when using preforms will assure a strong dependable joint. When brazing, make sure that the torch flame or other heat source does not play directly on the filler metal and melt it prematurely;

(Continued on page 52)

Rooftop Separators Minimize Effects of Chemical Reactor Explosion

AT ITS Kodak Park Works in Rochester, N. Y., Eastman Kodak Co. has installed a new type of safety device atop one of its chemical buildings. The device is designed to protect persons and property from the possible effects of an accidental chemical discharge.

The separators are of all-steel construction, specially designed by Kodak engineers to prevent discharge of substances into the air from chemical reactors in the building below.

Combining tank-type and turning-vane type centrifugal separators, the units measure four feet in diameter and 13 ft in height. The reactors within the building are connected to the separators through six-inch pipe, to the roof line, enlarged to 10 in. pipe to enter the separators. Several reactors are connected to separators.

Located in each run of six-inch pipe is a rupture disc designed to withstand 40 psi. In the event that pressure build-up in a reactor causes the disc to burst, the escaping chemicals are channeled from the reaction vessels upward through the pipe into the separator. Here the liquid chemicals are trapped, and vapor escapes into the air where it is absorbed.

Both a tank type and turning-vane type of centrifugal separator are employed to insure complete separation of the liquid from the vapor.

Rupture discs are more suited for Kodak's purposes, since valves are subject to sticking due to corrosion or gumming of the valve seat. In Kodak's application of the disc, it was only necessary that the disc withstand atmospheric pressure on the reverse side during vacuum operations.

An additional rupture disc, which will withstand 10 psi, is installed in each line to prevent the discharged gases from one reactor going into the pipes leading from the other reactors served by the same separator.

Fig. 1. Low-angle view of separators and pipes mounted on building roof

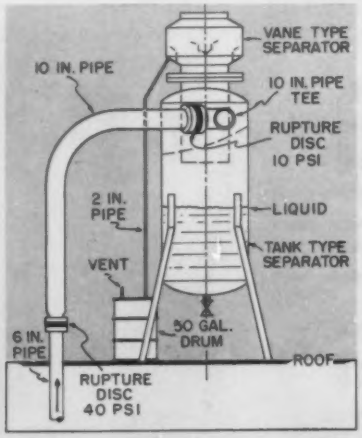
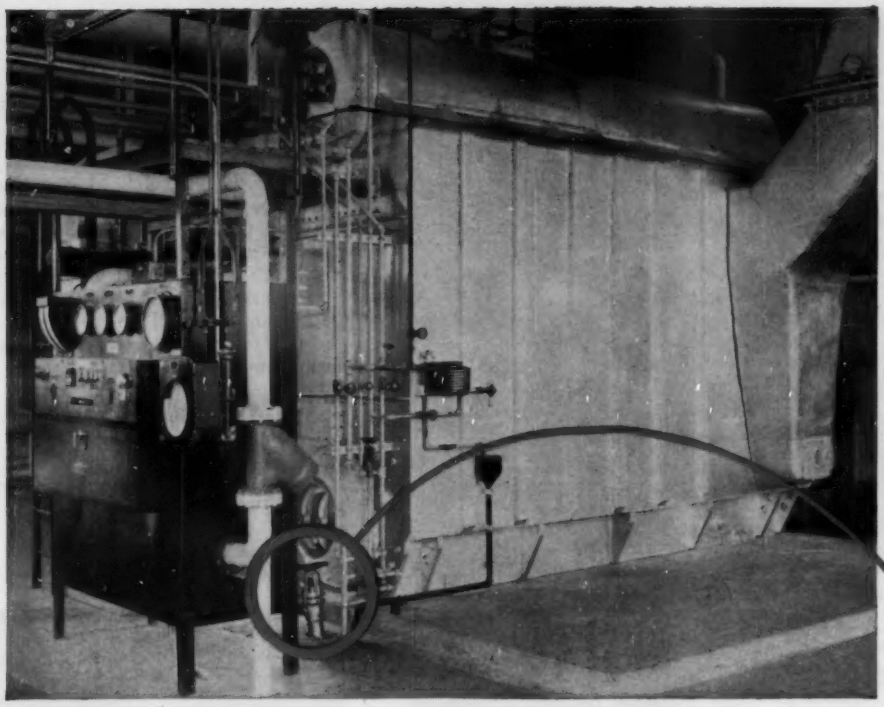


Fig. 2. Drawing shows construction and operating details of special separator



COMBUSTION ENGINEERING ADOPTS YARWAY SEATLESS BLOW-OFF VALVES FOR PACKAGE BOILERS

Combustion Engineering, Inc. on this package boiler installation at the Orangeburg Pipe Plant in California, again includes Yarway Seatless Blow-Off Valves as part of the "package."

It's a popular idea—and growing fast. All *good* package-type boiler installations are *better* when equipped with Yarway Seatless Blow-Off Valves.

More and more boilermakers are standardizing on Yarways, and more and more boiler users are expecting the advantages of Yarway Blow-Off Valves on their package units.

Get the full story on why more than 15,000 boiler plants use Yarway Blow-Off Valves, some for 30 to 40 years.

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

Yarway Type "B" Seatless Tandem Blow-Off Valve. Note balanced sliding plunger design with no seat to score, wear, clog or leak. Pressures to 400 psi.

YARWAY BLOW-OFF VALVES

For more facts circle 537 on Reply Card

Use of PYREX pipe in acid drain lines eliminates corrosion.

Eliminate pipeline corrosion
with PYREX® Glass Pipe
brand

Chemical plants have been using PYREX brand Glass Pipe for years to solve their severest pipeline corrosion problems. Other industries are discovering its advantages for acid drain lines and other chemical handling lines.

PYREX pipe will withstand virtually all acids and most alkalis. For example, carrying 5% hydrochloric acid at 212°F. continuously, PYREX pipe loses only .0003" of its thickness a year. At that rate it would take over 200 years to eat away 30% of the wall thickness. It would take over 600 years to eat completely through the pipe.

In addition to such sturdy corrosion resistance, PYREX pipe offers such advantages as transparency (you can spot trouble in the line before it gets serious); ease of cleaning; exceptional resistance to sudden temperature changes and physical shock. Long-time users report that breakage is no problem. Your own men can install it without special training or experience.

PYREX Pipe Bulletin EA-1 will give you a more detailed story. Write for a copy today or check the indicated reference number on this publication's Reply Card.

Corning means research in Glass

CORNING GLASS WORKS, 31-12 Crystal St., Corning, N. Y.

For more facts circle 538 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 48)

the heat to melt the filler should come from the parent metal, in all cases. Attention should also be paid to the shape of the assembly, to concentrate the heat in the thicker sections of the members. If the thinner sections are heated first, they may overheat and buckle or distort before the heavier sections reach the necessary brazing temperature.

Floating Fire-Fighter

RECENTLY DEMONSTRATED in England, a new device for fighting oil and gasoline tank fires is said to be capable of bringing fires under control within seconds.

It floats on the surface of the liquid

Photograph: British Information Services

Floating fire fighting unit, as it appears in oil storage tank operating position

in the tank and is triggered automatically by the heat generated in a fire. Vaporized liquids with a methyl bromide or chlorobromomethane base are sprayed from the revolving jets located on a shaft extending above the float.

The unit is manufactured by the National Fire Protection Co., Middlesex, England.

Meters Monitor Telephone Cables

GAS METERS are used as "trouble-shooters" for possible leaks in telephone cables in the Southwestern Bell Telephone Company's Brownsville, Texas, area.

The basic system is designed to pressurize the cable sheaths, to prevent entry of moisture. A compressor-dehydrator unit supplies air at 10 psi and a –40F dewpoint. This dehydrated air protects the paper and pulp insulation

A penny saved is a penny earned – *maybe!*

Any businessman knows that
saving a few pennies here
can cost a few dollars there.

We've all seen it demonstrated time and again—an inferior product that won't do the job can wind up costing money. As a matter of fact, this old business axiom is being proved in many company washrooms right now.

If the washroom is stocked with low-priced paper towels that go to pieces when wet . . . or if the towels are too stiff to soak up water . . . *then they're not saving a cent.* People will grab a fistful of such towels every time they wash up.

You can expect lower consumption with a quality towel

ScotTissue Towels are not the lowest priced towel on the market, but *one ScotTissue dries two hands.* People don't have to reach for a second towel. This means consumption is lower—and so are your towel bills.

The ScotTissue Towel combines many qualities—such as fast absorbency, wet-strength, stretch, softness and whiteness—which mean much more towel for your towel-buying dollar.

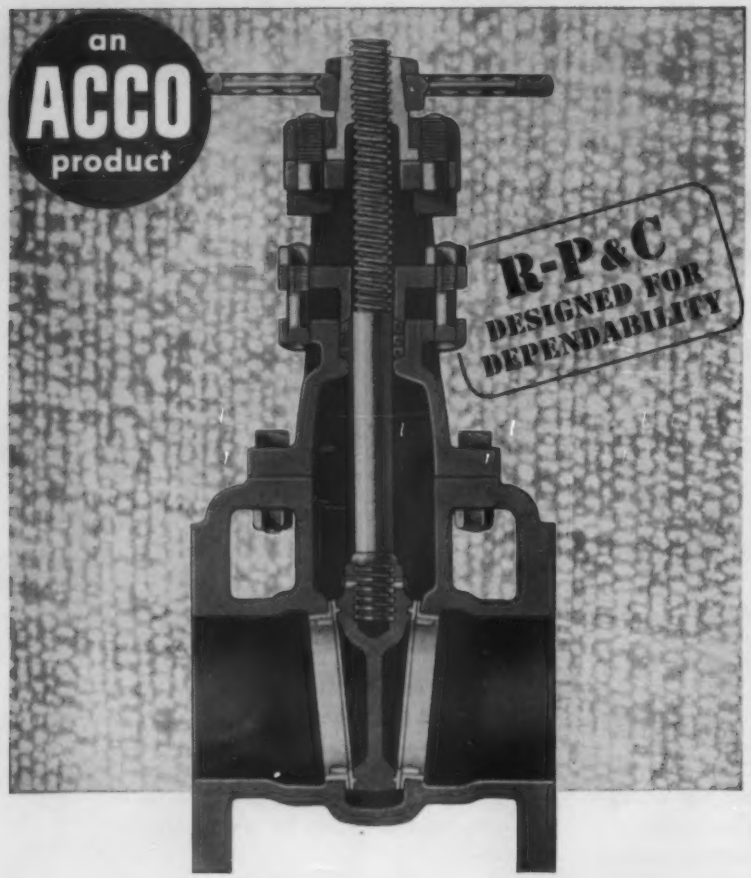
Scott boosts employee morale

People buy more Scott products for their own use than any other brand. So naturally it's the brand they like to see provided where they work. According to a recent survey, good washroom facilities are one of the four main essentials for good employee relations.

Your nearest Scott representative can tell you why ScotTissue Towels will give you lowest towel consumption, greatest employee satisfaction, and lowest towel costs, all things fairly considered. Also, Scott offers a "Planned Poster Program" which you will find helps to cut down consumption, and promote cleanliness in your washrooms. This program can be yours without obligation—write to Scott Washroom Service®, Scott Paper Company, Dept. PE-12, Chester, Pa.

It's good business to use

SCOTTISSUE® TOWELS



Wedge Gates from 2" to 24"

—FROM R-P&C's COMPLETE LINE OF IRON BODY VALVES

• Thousands of these **Fig. 625** iron body wedge gate valves, in hundreds of different services, are giving the dependable economical service which has come to be synonymous with R-P&C. Rated for 125 lbs. Steam—200 lbs. OWG in sizes up to 12", and for slightly lower pressures in larger sizes, they are regularly furnished with bronze trim for use with steam, water, oil or gas. Also provided in all-iron for use with fluids which attack bronze.

• Their record for dependable service and low maintenance requirements is shared by R-P&C's complete line of iron body valves—gates, globes, angles, checks and cocks in a complete range of sizes, body styles and pressure classes up to 250 lbs. All are made from castings of special fine-grained, high test, cast iron —50% stronger than ordinary cast iron. Precision manufacturing and step-by-step quality control result in tight closures, easy operation and longer wear.

See your R-P&C distributor or write for catalog

ACCO

R-P&C Valve Division
AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

R-P&C valves

For more facts circle 540 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 48)

Bank of gas meters installed to measure air flow into telephone cable sheaths

on the conductors inside the cable sheath.

Gas meters, mounted in the lines feeding dry air to the sheaths, show changes in air consumption of the cables. Such changes indicate leaks in the cable sheath, before a serious service interruption occurs.

Air flow is recorded on Emco meters, manufactured by the Rockwell Manufacturing Co. The meters are read on a weekly schedule, and any serious variation in the flow of gas to a particular cable during a week is good indication of a developing trouble spot. Repair work can be readily scheduled to inspect and repair any potential cable leaks promptly.

Pump Does Double Duty—Homogenizes the Product it Pumps

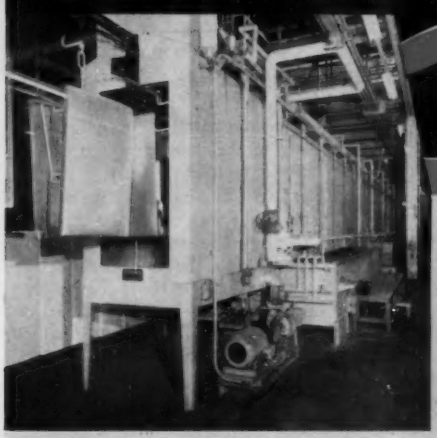
LOADING a tank car of magnesium hydroxide, which formerly consumed the better part of 48 hours at the Moss Landing, California plant of Kaiser Aluminum and Chemical Corporation, is now being done in 75 minutes.

After its extraction from sea water, the viscous material was loaded into a tank car by alternately feeding it by gravity into the tank manhole, where its high solids content caused it to build up in a mound, then bumping the car to distribute the mass throughout the car.

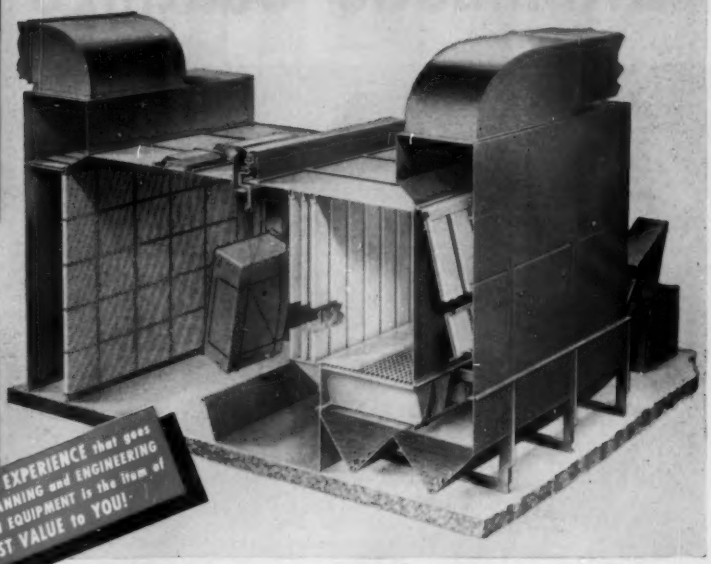
Current procedure for loading the cars is based on the use of a Kinney Heliquad pump. The magnesium hydroxide leaves the process as a viscous filter cake, and is fed by a screw conveyor into a collecting tank, and from

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

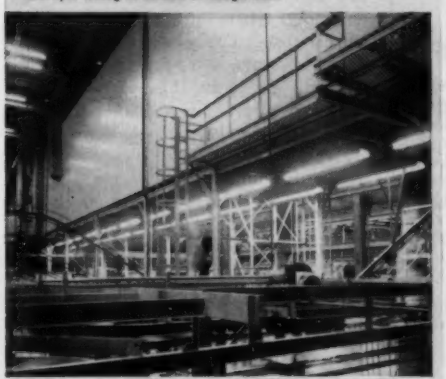


One of Two Mahon Seven-Stage Metal Cleaning and Rust Proofing Machines designed for processing Refrigerator Parts and installed in the plant of one of the world's largest manufacturers of Home Appliances.



. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

One of Four Mahon TYPE 54 AC-F PUMPLESS Hydro-Filter Spray Booths installed in the Porcelain Enamel Finishing Line of the same manufacturer referred to above. Note tubular sludge unloading conveyor casing at bottom of sludge tank.



Mahon Double-Deck Overhead Frit Drying Oven in the Porcelain Enamel Finishing Line of the same manufacturer referred to above. Other Mahon equipment in this finishing operation includes Dry-Off Ovens, Cooling Tunnels, Brushing Booths, Touch-Up Booths, Filtered Air Supply System and other Special Items.

PUMPLESS Hydro-Filter SPRAY BOOTH is Highly Successful in FRIT SPRAYING OPERATIONS!

Mahon Type 54 AC-F Hydro-Filter Spray Booth, designed especially for Frit Spraying in porcelain enameling operations, is a departure from the conventional water-wash spray booth. There are no recirculating pumps. The normal exhaust fan, used to ventilate the spray booth, provides the washing action through air accelerators which impinge the airborne frit particles into the surface of the water in the sludge tank. Dry baffle plates are provided in front of the Hydro-Filter chamber for maximum recovery of Frit. The bottom of the sludge tank is in the form of two "V" shaped hoppers with the continuous conveyor of the automatic sludge unloader at the bottom. In the development of Type 54 AC-F, Mahon engineers have not only produced a highly effective Frit Booth, but, through elimination of high pressure pumps and the addition of the automatic sludge unloader, have reduced operating cost and maintenance to an absolute minimum. If you have a finishing problem, or are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified, also, to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. No matter what you paint, or by what process, Mahon equipment will serve you better . . . because its engineered better and built better for more economical operation over a longer period of time. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-656.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

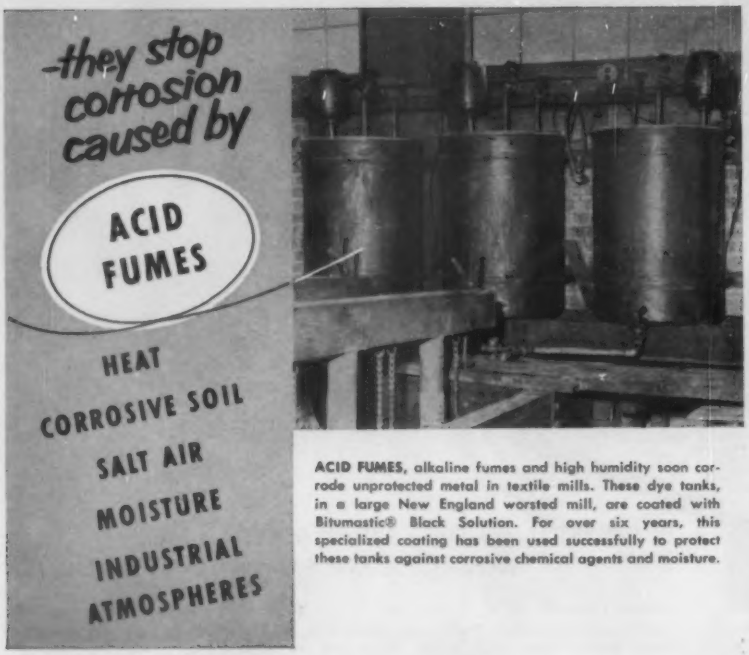
SALES ENGINEERING OFFICES in NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 541 on Reply Card

You can solve your **tough** corrosion problems by using Bitumastic® Coatings



ACID FUMES, alkaline fumes and high humidity soon corrode unprotected metal in textile mills. These dye tanks, in a large New England worsted mill, are coated with Bitumastic® Black Solution. For over six years, this specialized coating has been used successfully to protect these tanks against corrosive chemical agents and moisture.

TOUGH CORROSION PROBLEMS can be solved, but not by using ordinary paints or conventional protective coatings. For long-term protection, it takes *specialized* protective coatings . . . the Bitumastic Coatings Koppers makes.

Bitumastic Protective Coatings are specially formulated from a tar-pitch base* that is, for all practical purposes, impervious to moisture. These coatings keep moisture away from exposed metal surfaces . . . and that's the *best* way to stop corrosion.

With tough, durable Bitumastic Protective Coatings, a thickness up to eight times that of ordinary paints can be obtained in one application. Where other factors are equal, the *thicker* the coating the *longer* the period of protection.

Send for a set of free booklets describing the family of Bitumastic Protective Coatings. At the same time, tell us about *your* corrosion problems so that we can suggest a satisfactory solution. There is no obligation, of course.

** Hi-Heat Gray is a non-coal-tar vehicle and metallic pigment.*

see our catalog in S or write for copy

KOPPERS COMPANY, INC.

Tar Products Division, 1223-T, Pittsburgh 19, Pennsylvania

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

KOPPERS PRODUCTS LIMITED District Offices: Toronto & Edmonton

MADE ONLY BY KOPPERS

BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS ®

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 48)

there into the intake pipe of the pump, which is located at ground level. Under approximately 60 psi, the cake flows out of the pump through a 6-in. line to the tank car. Valving in the line permits pumping directly into the rail car or recirculating the material back through the collecting tank.

Connected to the end of the discharge pipe that extends down into the tank car is a 4-in. tee, reduced on both legs to a ¾-in. nozzle, which squirts the hydroxide against the end of the tank car.

This simplified handling procedure has resulted from an unforeseen action of the pump on the semi-solid filter cake. The pump acts as a homogenizer, improving the consistency of the high-solid material to the point where it flows fairly readily. In addition to improving the handling of the material for tank car loading, it has been found that the homogenized magnesium hydroxide no longer separates from its water of solution during transit—a separation that produced an extremely difficult unloading problem for the user.

Globe Valve Installation Hints

Contributed by Leo Walter

GLOBE VALVES, which can be used for both shut-off and throttling duties, depend on their contacting faces for food functioning. These surfaces fail if they become scored or eroded by the fluid passing through them. For example, where steam of high pressure is used with globe valves having bevelled seats, wire-drawing will develop if the valve has to perform a throttling duty for a long period of time. This is particularly true if the valve is oversize.

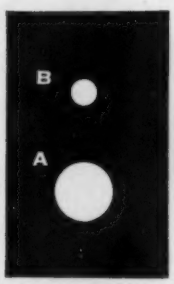
In this application, correct valve sizing is necessary, since a poorly selected valve size can cause wear of the valve seat and disc. The actual working position of a throttling globe valve must be somewhere in the middle of the total possible valve lift, therefore oversize valves should not be used for most throttling applications.

Conversely, it might be advisable to substitute oversize valves for those applications where excessive pressure loss and extreme valve wear indicate undersize valves in shut-off service.

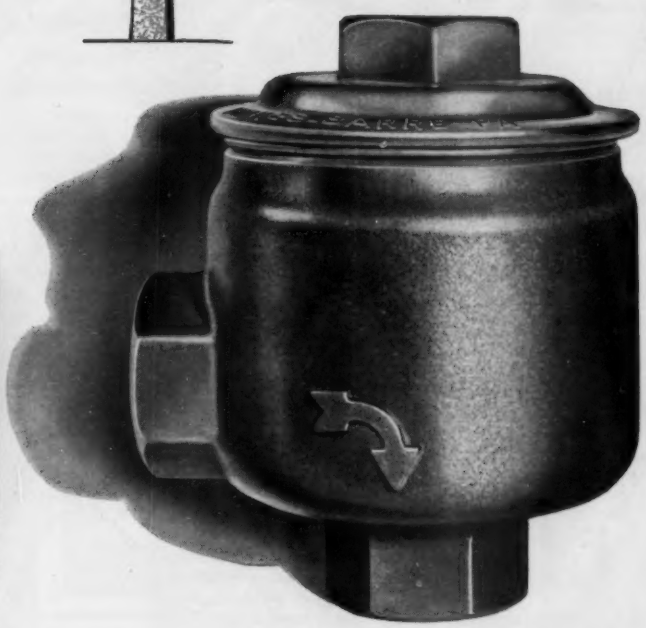
Impingement of high velocity fluids carrying abrasive solid particles is highly detrimental to valve seats and discs. The use of pipeline strainers in front of valves in this type duty cannot be over-emphasized, in spite of

TALK ABOUT

Capacity



Discharge orifice of 1" NICHOLSON trap (A) compared with other types of same size (B). Nicholson's greater—in every size!



Compare capacity of a Nicholson Steam Trap with any other trap of same size. Greater capacity—right across the board—means Nicholson Industrial Traps discharge condensate and air from steam lines and process equipment *faster*, more *effectively*. In toughest plant service, Nicholson's pay off 4 ways:

- **lower initial cost—more for the money**
- **less upkeep expense—minor maintenance**
- **faster warmup—high, even temperatures**
- **faster production—increased 20% to 30%**

Where performance counts, specify Nicholson. Write for *Catalog 953*.

NICHOLSON

W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 58 PRINCIPAL CITIES

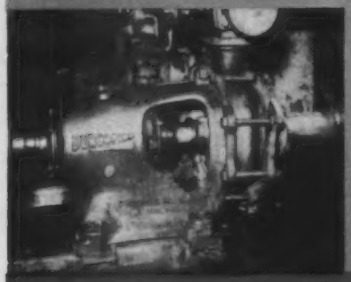
For more facts circle 543 on Reply Card

$793.50 Saved on Three Acid Pumps!

$793.50* has been saved, to date, on these three tough pumping jobs by reduced stuffing box maintenance. These pumps have given continuous, trouble-free service after

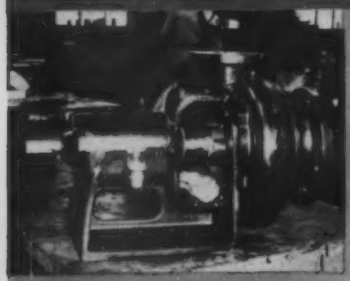
CHEMPRO Mechanical Seals†

were installed. In pump after pump, the Chempro seal has paid for itself in the first few months of service.



1 Durichlor Model X3RG-100 Durcopump, handling 30% HCl in a dyestuff plant. This large 2¼" Chempro Style WLC seal has operated for more than eight months without leakage.

2 LaBour No. 20 Type DLP pump unloading tank cars of oleum and 96% H_2SO_4 in a chemical plant. Before installing a Chempro Style WLZ seal, this pump was repacked weekly. The Chempro seal has given more than 11 months of trouble-free service.



3 Worthington 4CNG-84 pump operating on 94% H_2SO_4 in an oil refinery. A No. 175 Chempro Style WLZ seal solved the packing problem after it was installed more than seven months ago and is giving 100% leak-free service.

*Based on users figures. †Patented

Write for new Chempro Seal Bulletin CP551

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N. Y.

For more facts circle 544 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 48)

additional first cost. Strainers can save considerable valve maintenance work, will pay off their first installation cost quickly, and present no maintenance problems in themselves. It is a simple matter to periodically blow out a strainer, or to remove its screen for weekend or after-hours cleaning.

The introduction of stainless steel seats and discs has greatly reduced maintenance problems. Seats are usually permanently pressed into the body castings. Renewable seats may be preferable in instances where regrinding has to be repeatedly performed.

All-Plastic Spray Header

MEASURING 13 ft in overall length, a spray header system required 82 ft of Koroseal high-impact rigid pipe for its construction by the Barber-Webb Company, Los Angeles.

Built for an aircraft plant installation, the rectangular-shaped spray system uses sizes of plastic pipe ranging from ½-in. to 3-in. ID. It is considered to be the first complete unit of its type, fabricated entirely from plastic pipe and fittings.

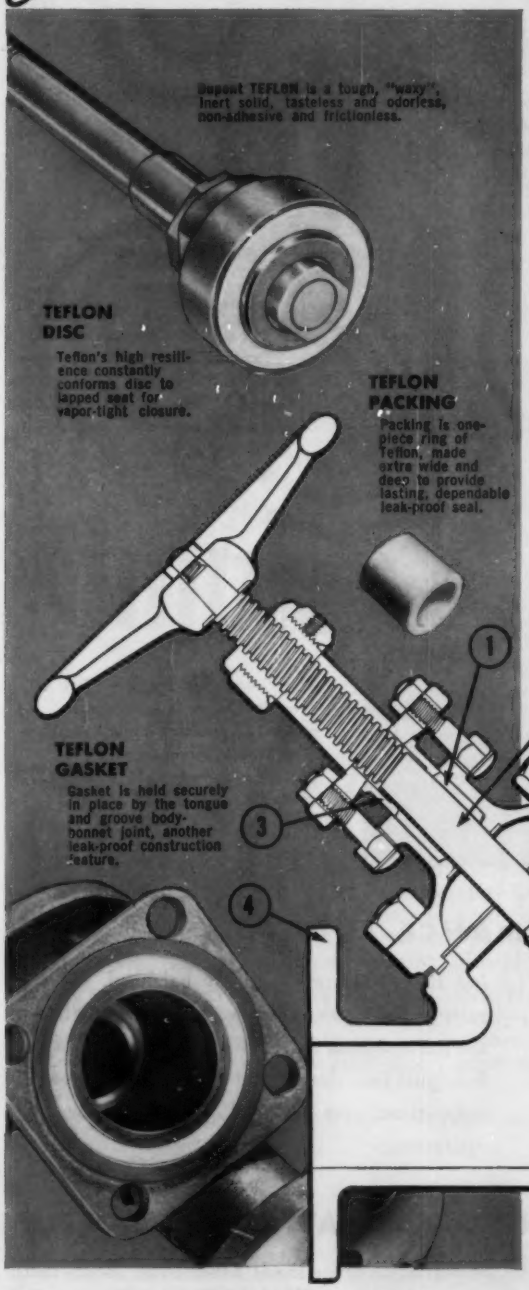
Destined for installation for metal bond cleaning of airframe parts, where exterior exposure to acid would cause corrosion of a metal pipe system, the spray header will carry demineralized water for spraying the parts after an acid pickle bath.

In addition to the plastic pipe, the unit also uses Koroseal rigid tees, reducing bushings, ells, caps and companion flanges secured with machined plastic nuts and bolts. There are 48 spray orifices.

Photograph: B. F. Goodrich Co.

Assembler adds fittings to spray header system fabricated from plastic pipe

Jenkins designed for trouble-free performance... a


Dupont TEFLON is a tough, "waxy", inert solid, tasteless and odorless, non-adhesive and frictionless.
TEFLON DISC
Teflon's high resilience constantly conforms disc to lapped seat for vapor-tight closure.
TEFLON PACKING
Packing is one-piece ring of Teflon, made extra wide and deep to provide lasting, dependable leak-proof seal.
TEFLON GASKET
Gasket is held securely in place by the tongue and groove body-bonnet joint, another leak-proof construction feature.
1
2
3
4

STAINLESS STEEL "Y"

to lower costs in a wider range of

CORROSIVE SERVICES

For food and chemcial plants, and similar services, Jenkins Fig. 1335 "Y" Globe offers many advanced features that will lower operating costs and keep your processing lines trouble-free. The disc, packing, and gasket are tough, resilient Teflon. Tasteless and odorless, it eliminates problems of contamination.

The "Y" pattern permits full flow, nearly equal to that of a gate valve, and also provides the vapor-tight closure and the ease of disc renewal of a globe valve.

Fig. 1335 offers extra value by any test . . . *initial cost, operating efficiency, low maintenance.* You can convert this extra value into *extra savings* on your toughest corrosive services. Call your Jenkins Distributor, or write: Jenkins Bros., 100 Park Ave., New York 17.

FULL, FREE FLOW
through Fig. 1335 is nearly equal to flow through a gate valve.

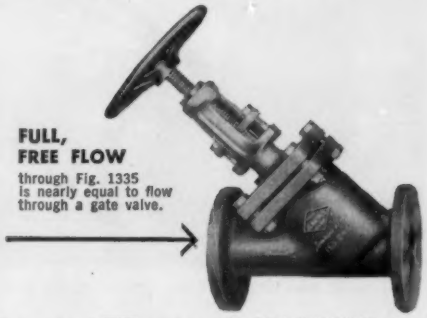


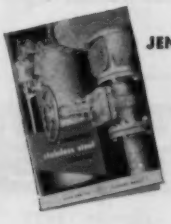
Fig. 1335 "Y" GLOBE
150 lbs. O.W.G. at 500°F
230 lbs. O.W.G. at 100°F
Sizes 1" to 4"

(1) **Packing Box—Exceptionally deep and wide to hold optimum size packing.**

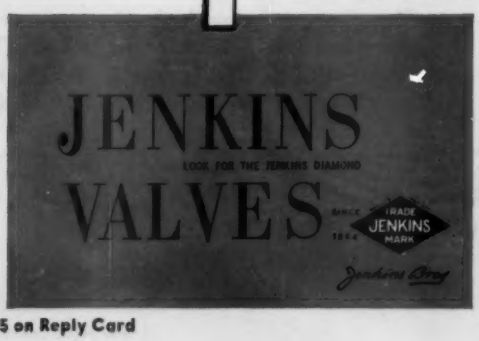
(2) **Spindle—Polished shank, long-operating threads, bevel shoulder for backseating.**

(3) **Gland—Two-piece for equalized pressure, tight seal.**

(4) **Flanges—Conform to M.S.S. Standard Practice S.P.42 Specifications.**



JENKINS STAINLESS STEEL VALVE BOOKLET illustrates and describes wide range of Jenkins Globe, Gate, Check, and Y Valves, includes selection data, survey forms. Ask for Form 200-A.



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75 YEARS OF BUCYRUS-ERIE LEADERSHIP . . .

December 18 marks Bucyrus-Erie's 75th Anniversary. In the years since 1880, the company has been proud to bring many significant advancements to the design of excavator-cranes . . . the first electric and the first diesel excavators . . . the first crawler-mounted dragline . . . the first all-hydraulic, truck-mounted crane . . . and too many more "firsts" to detail here. Most important, however, the know-how back of these is yours in whatever Bucyrus-Erie machine you use.

President Theodore Roosevelt Visits Panama Canal: This Bucyrus-Erie shovel, one of 77 used on the Big Ditch, was included in his 1908 inspection tour.

The 25-ton Bucyrus-Erie 22-B Transit Crane is a versatile material handling unit for yard work. A smaller 15-ton unit, the model 15-B, is also offered.

. . . GIVES YOU TOP PERFORMANCE TODAY . . .

You can expect top performance from a Bucyrus-Erie machine because it's *built right in.* It starts with Individual Design — which means that each model in the line is designed from the ground up to handle the rated load. There is no over-powering or over-dippering to create "new" models. Parts are properly proportioned, operating functions are effectively balanced. This results in fast work cycles, with maximum time on the job and long service life. The extras Bucyrus-Erie puts into design and manufacturing pay off many times over in added output and lower cost operation.

. . . PROMISES EVEN BETTER CRANES AND EXCAVATORS TOMORROW

You can expect even higher performance standards from Bucyrus-Erie in years to come. The development of new and improved designs, and the search for better materials and more efficient manufacturing methods never ends. With facilities unsurpassed in the industry, Bucyrus-Erie promises you machines that will serve you better than ever.

27Y55

BUCYRUS-ERIE COMPANY South Milwaukee, Wis.

75 Years of Service

to Men Who Shape the Earth

BUCYRUS ERIE

1880 • 1955

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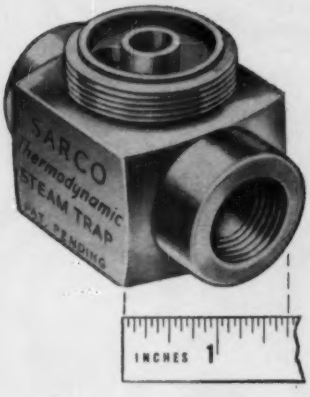
Now — A Revolutionary NEW Steam Trap!

What could be simpler?

1. A CAP

2. A DISC

3. A BODY



That's all!

Practically Eliminates Maintenance!

Look at this revolutionary new thermodynamic steam trap. Could it possibly be simpler? Look for the valve closing mechanism—there isn't any! The kinetic energy of steam closes the valve and *only* the TD uses this new operating principle.

Only 3 parts... cap, disc and body... machined from stainless steel bar stock... all extremely simple, rugged, durable. Only one moving part... a hardened SOLID stainless steel disc... practically wear-proof.

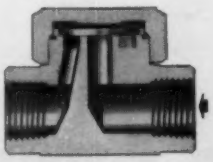
Just imagine how much time and expense this new TD steam trap can save you by greatly reducing and simplifying trap maintenance and inventory!

SOME OF MANY OTHER ADVANTAGES:

1. Use the same trap for 10-600 psi... for light or heavy loads ... without seat or valve change or other adjustments.
2. Closes tight on no load — no steam waste.
3. Operates against back pressures up to 50% of inlet pressure.
4. Not affected by superheat, water-hammer, corrosive condensate.
5. Only one spare part—solid stainless steel disc.

TROUBLE-FREE DESIGN

No valve-closing mechanism to wear or stick—the kinetic energy of steam closes the valve. No critical clearances to choke. No gaskets to leak. Only one moving part—a SOLID stainless steel disc.



Ask for a 60 day trial installation of Sarco TD trap and strainer... write for bulletin 257. Sarco Co., Inc., Empire State Bldg., New York 1, N. Y.

SARCO

2148-B

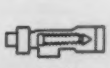
Only Sarco Makes All 5 Types

That's why Sarco can give impartial advice on proper steam trap selection.

Thermodynamic Steam Traps

Thermostatic Steam Traps

Float Thermostatic Steam Traps


Liquid Expansion Steam Traps

Camlift Bucket Steam Traps

For more facts circle 546 on Reply Card

Drilling

Busting

Tamping

Plant maintenance can cost less with these Gardner-Denver air tools

They're designed to fit the work—to help you get your jobs done faster.

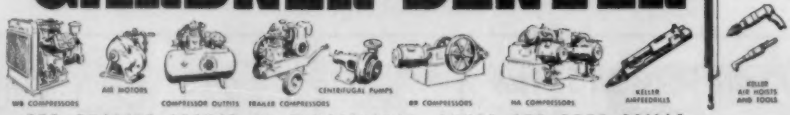
They're ruggedly built to stand the gaff—give long service with minimum maintenance.

Our many years of experience in building air tools for contractors, builders and plant maintenance men mean you get the best from Gardner-Denver. Write for descriptive bulletins.

Other maintenance tools by Gardner-Denver and Keller Tool

- Portable Air Compressors
- Trench Diggers
- Clay Spaders
- Sump Pumps
- Air Hoists
- Impact Wrenches
- Grinders and Sanders
- Air Line Lubricators

GARDNER-DENVER

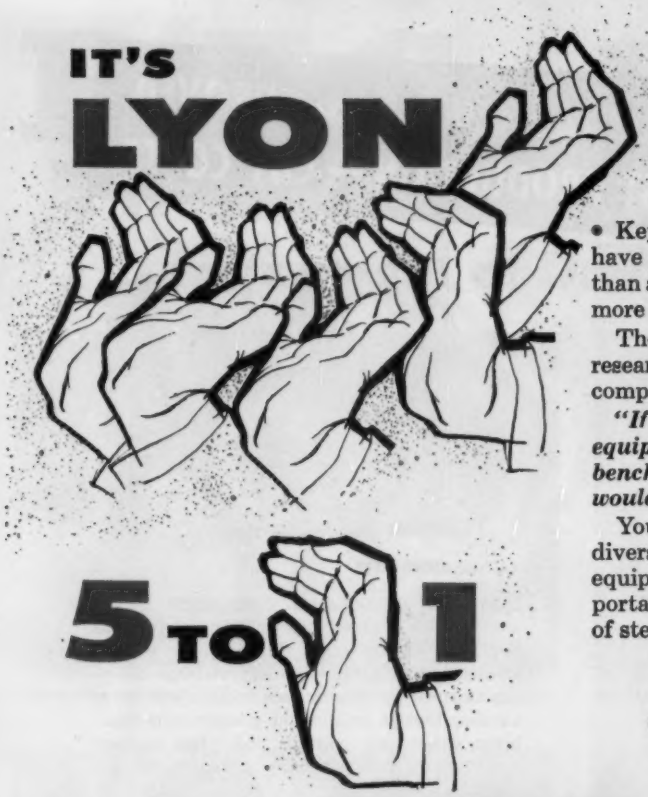


THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada) Ltd., 14 Curity Ave., Toronto 16, Ontario

For more facts circle 547 on Reply Card

IT'S LYON 5 TO 1



• Key men in companies throughout the country have given Lyon five times more first choice votes than any other steel equipment manufacturer! And more than the next thirteen combined!

Those are the findings of a nationally known research organization that asked executives in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's most diversified and most preferred line of quality steel equipment. (A few are shown below.) Equally important, he can show you how to get the most out of steel equipment in time, space and money.

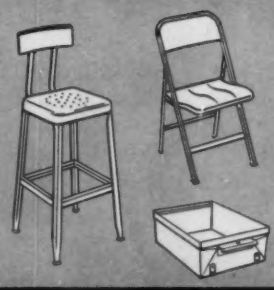
LYON METAL PRODUCTS, INC.
General Offices: 1291 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities

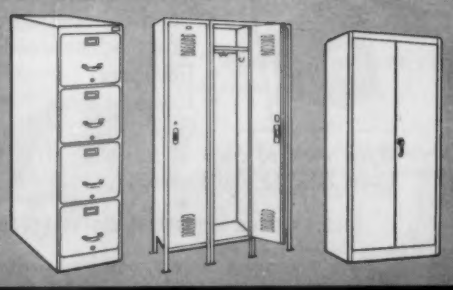
Lyon also has complete facilities for manufacturing special items to your specifications.

LYON®

STEEL EQUIPMENT

for BUSINESS • INDUSTRY • INSTITUTIONS also STEEL KITCHENS for THE HOME





A PARTIAL LIST OF LYON STANDARD PRODUCTS

• Shelving	• Kitchen Cabinets	• Tool Toters	• New Freedom Kitchens	• Flat Drawer Files	• Folding Chairs	• Service Carts	• Tool Stands
• Lockers	• Cabinet Benches	• Bar Racks	• Display Equipment	• Revolving Bins	• Coat Racks	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Filing Cabinets	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

For more facts circle 548 on Reply Card

42 MANUFACTURERS *at the Tool Show* PROVED BARRY MOUNTS BOOST PRODUCTION — CUT COSTS

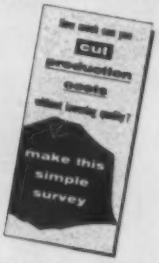
400-TON BLISS PRESS "FLOATS" ON BARRY MOUNTS. With no special foundation, or floor preparation, this knuckle-joint press weighing 26,500 lbs. was installed, leveled, and ready for demonstration in less than 30 minutes. The saving in cost of installation for this and two other giant presses far exceeded the cost of the Barry Leveling Mounts used — with the plus value of freedom from frame stresses met in lagged down installations.

CONSISTENT HIGH-QUALITY PRODUCTION to extremely close tolerances was demonstrated in the Sheffield precision gear grinder exhibit without interference from the pounding of huge heavy-impact presses in adjacent show spaces. With Barry Leveling Mounts isolating the grinders from floor-borne shocks, one operator said, "This machine is performing excellently. I'm getting *no* rejects".

YOU CAN GET MORE and BETTER PRODUCTION

and lower costs in YOUR plant — even if you have problems as tough as any met by machine-tool builders at the Chicago show.

This FREE check-chart shows proved cures for such dollar-eaters as:



- Frozen machine layouts
- Too much downtime
- Machine duplication
- In-line maintenance
- Building-borne vibration
- Slow machine speeds
- Idle space
- Excessive noise

Write for free copy of Barry Plant Survey Chart SA-755 and Product Bulletin 546.

•

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

•

Barry's expansion program offers engineering opportunities at all levels in all departments.

HIGH-SPEED, POWER SHEAR PRODUCTION by Famco was made easy to display by use of Barry Mounts. Installation and leveling was a matter of a few minutes. Then, with day after day operation at up to 85 strokes per minute, the shear did not "walk" . . . while vibration-sensitive lathes and grinders in nearby booths were reported unaffected by the high-speed, heavy impact.

BARRY CONTROLS incorporated **910 Pleasant St. Watertown 72, Mass.**

For more facts circle 549 on Reply Card

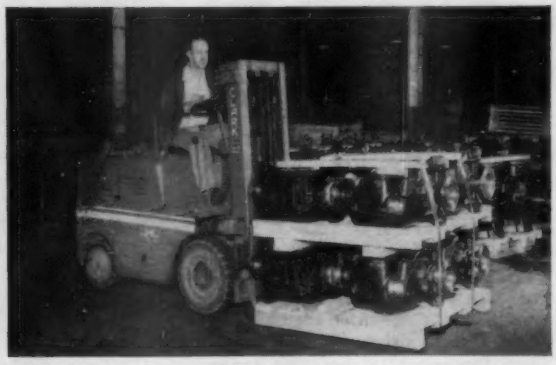
B.F.Goodrich

TW TIRE AND WHEEL ANALYSIS boosts tire life in every department of Dana Corporation

Unloading 2 tons of clutch plate castings at Dana receiving dept.

7200 pounds of castings on their way to the production line.

Stored synchronizing rings outside the heat treating dept.



A load of Dana transmissions arrives in shipping department.

THE Dana Corporation manufactures truck and bus transmissions in its Toledo, Ohio, plant. Materials handling equipment is used to haul supplies, parts and finished transmissions all over the factory, from receiving room to shipping department. Tires roll through storage yards, over oil-soaked floors, over sharp steel shavings.

Here was a job for the B. F. Goodrich Tire and Wheel Analysis man. He studied Dana's equipment, loads and hauling surfaces. Then he recommended the right tire types, sizes, tread designs and tread compounds. Garageman Anthony Bosch says he's had tires that didn't last half as long as those recommended by the B. F. Goodrich TW Analysis man.

How about a FREE TW Analysis for you?

Dana Corporation's case is not unusual. The B. F. Goodrich FREE Tire and Wheel Analysis is saving time and money for industrial tire users all over the country. How about *you?* Just call your local B. F. Goodrich retailer or mail the coupon. This no-obligation Analysis includes money-saving maintenance tips as well as tire recommendations. You can be sure the advice you get is unbiased, because B. F. Goodrich makes a *complete* line of industrial tires. Act now! And if you manufacture materials handling equipment, there's a special TW Analysis for you.

Specify B. F. Goodrich tires when you order new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-549,
Akron 18, Ohio

Please send me:
- ☐ Additional information on your Tire and Wheel Analysis Plan
- ☐ Free copy of "Industrial Tire Guidebook"
- ☐ Free copy of "How to Get Extra Service out of Solid Industrial Tires"

Name_____
Company_____
Street_____
City_____ Zone____ State_____

For more facts circle 550 on Reply Card

Hall Industrial Water Report

VOLUME 3 DECEMBER 1955 NUMBER 6

It Takes a Lot of Water to Process Food

In this 60-billion-dollar-a-year business, Hall helps to keep production up by keeping troubles with water down in plants from Massachusetts to California and from Florida to Washington. Not only the conditioning of water for steam power and steam heating, for cooling and for cleaning and processing, but also the processing of waste water for re-use, requires expert consultation and continuing service.

Maintenance Reduced in Plant Condensate System

Severe corrosion was being experienced throughout the condensate system of an Eastern chocolate manufacturing plant, with periodic replacement of sections of return line. Robert Dow, service engineer in the Boston office of Hall Laboratories, suggested a survey with corrosion test specimens to determine how much the use of Hagafilm® might improve conditions.

Weight losses on the test specimens before treatment revealed corrosion rates in most of the return lines sufficiently high to justify treatment. Simple gravity feed of Hagafilm to the boiler feedwater at the suction side of the boiler feed pump was accordingly started.

During the first three months, old corrosion products loosened by the action of the filming amine occasionally plugged traps and strainers. Then the intervals between maintenance calls lengthened until six months would elapse without a single call for a trap to be cleaned or a corroded pipe fitting to be replaced.

When Bob Dow suggested further tests with specimens to measure the effectiveness of the Hagafilm, plant personnel said they already had all the evidence they needed.

Sweetened Boiler Water Not to Plant's Taste

A call for help reached Hall engineer Robert Hobek from a fruit processing plant in Kentucky. Carryover from a boiler suggested that a slug of sugar syrup had somehow leaked into the condensate return system.

Steam coils used to heat some of the processing vats were immediately suspected, since the vacuum created when the steam was shut off could suck the liquid from a vat through any leak in the coil. A careful check revealed the expected perforation in one of the coils. This was repaired and all other coils were checked.

Most of the cooking was done with jacketed kettles so a drain valve was installed on each steam jacket, to be left open at the end of each day. In the morning the steam inlet valve to each jacket was partially opened and the first condensate running out of the drain valve was checked visually for any color indicating contamination.

Jacketed equipment is now used exclusively in the plant. No further difficulty with the sweetened boiler water has been experienced.

Fungus Attack on Cooling Tower Stopped

A mossy organic growth found in patches above the spray line in the top of their cooling tower was cause for concern to an Eastern food processing plant. Hall Laboratories' representative Jack White hurried samples to Hall headquarters in Pittsburgh for examination.

Out of the laboratory came the report that the damaged wood was infected with the same destructive fungus which had played havoc with a number of cooling towers in the Gulf Coast area, in one instance to the extent of $100,000 a year for replacement of wood.

Quick direct treatment of the wood was necessary. Hall engineer Ed Stewart arranged to have the plant personnel spray the cooling tower three times in a month with a trichlorphenate compound, soaking the wood thoroughly each time. An inspection then showed no signs of fungus attack in the zone where previously it had been severe. The plant has continued to spray the tower periodically with excellent results. No sign of fungus attack has yet appeared on a test board installed in 1953.

Plants which are not able to shut down periodically for spraying can protect the wood for prolonged periods by treating it successively with two water-soluble chemicals which interact to form a precipitate with fungicidal properties deep within the wood.

Hall Helps Hams

Hottest development in the curing of hams is an invention by G. O. Hall of Hall Laboratories described in U. S. Patent 2,513,094, now being developed commercially by Calgon, Inc., under the trade-mark Curafos.® By the properly controlled use of complex phosphates in the pumping pickle injected into the ham to produce the cure, the meat will retain its attractive color even when sliced and exposed to fluorescent lights at retail meat counters.

Industrial Water Problems Require Special Handling

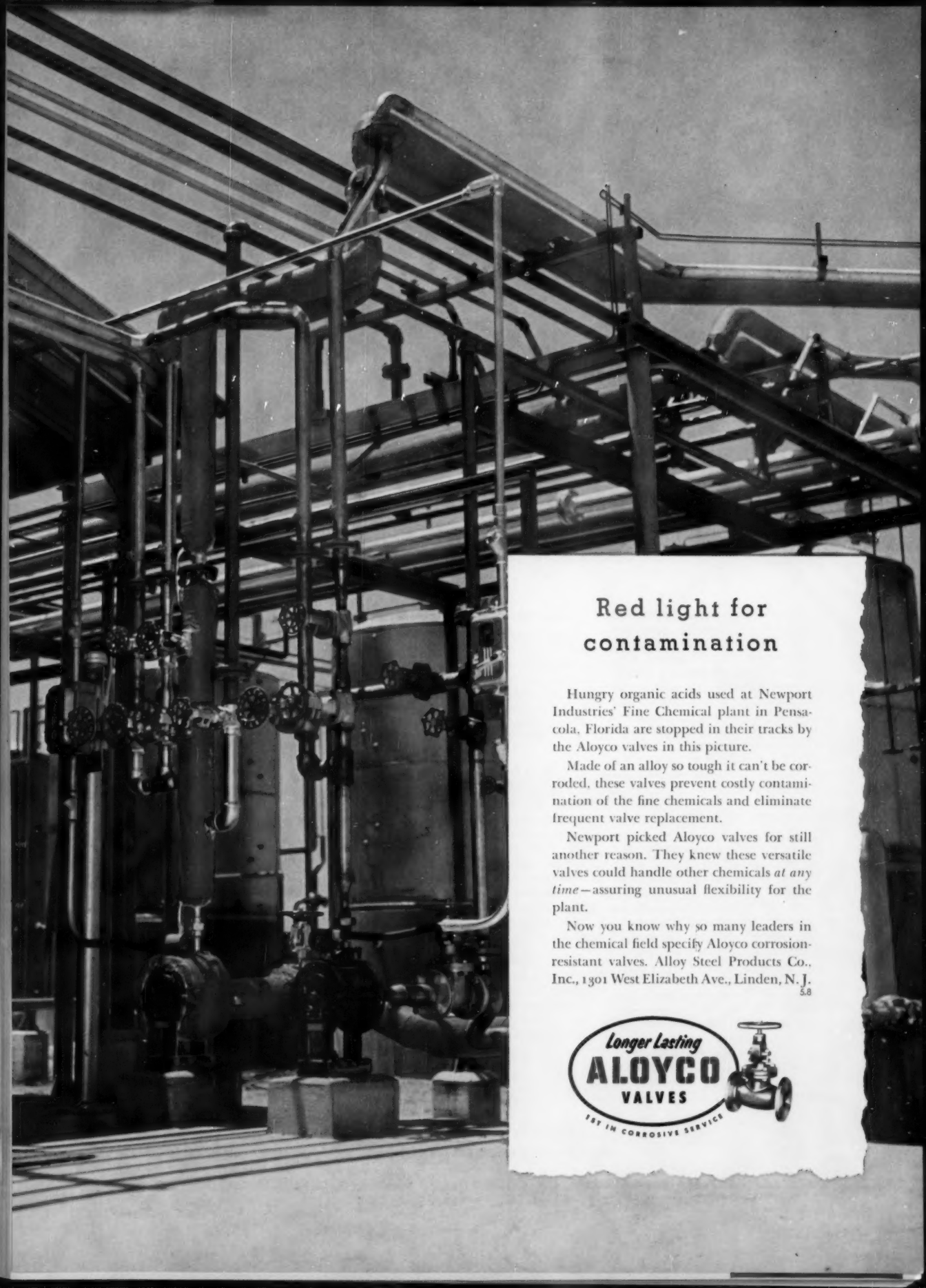
There are no "stock answers" to industrial water problems. For information, write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Hall Laboratories, Inc.—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 551 on Reply Card

For more facts circle 552 on Reply Card →



Red light for contamination

Hungry organic acids used at Newport Industries' Fine Chemical plant in Pensacola, Florida are stopped in their tracks by the Aloyco valves in this picture.

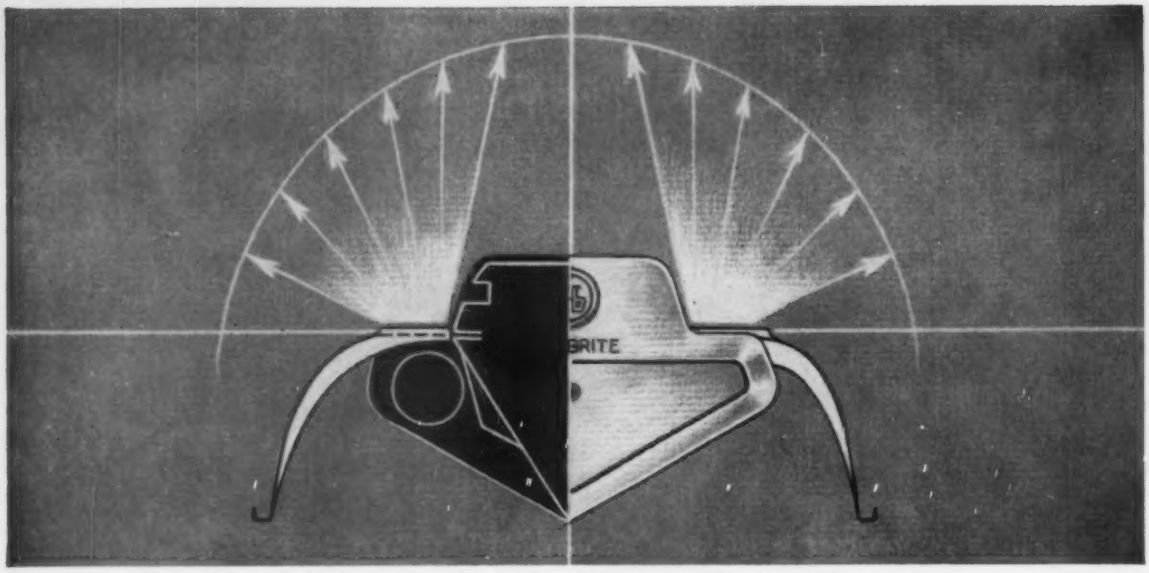
Made of an alloy so tough it can't be corroded, these valves prevent costly contamination of the fine chemicals and eliminate frequent valve replacement.

Newport picked Aloyco valves for still another reason. They knew these versatile valves could handle other chemicals *at any time*—assuring unusual flexibility for the plant.

Now you know why so many leaders in the chemical field specify Aloyco corrosion-resistant valves. Alloy Steel Products Co., Inc., 1301 West Elizabeth Ave., Linden, N. J.

5.8

Longer Lasting
ALOYCO
VALVES
1ST IN CORROSIVE SERVICE



New Day-Brite upward lighting *achieves new production highs*

Visual tasks are becoming more and more acute as industry adopts new production techniques. Unusual accuracies, extreme tolerances, delicate color separations and speedy readings of charts and graphs demand the most in "see-ability" and the least in eyestrain. Both are supplied by Day-Brite new CFI (*C*omfort *F*or *I*ndustry) lighting—especially developed to establish a high degree of visual comfort for industry workers.

Radically different lighting system

The Day-Brite CFI principle differs radically from previous design and application practices. Slotted apertures are introduced *in the tops* of the fixture reflectors—a calculated portion of the available light is directed *upward* toward the ceiling. Harsh ceiling contrasts are washed out—"hot spots" of light eliminated. Advantage is taken of the reflectance values of lighter-colored walls and ceilings. Thus, visual strain and discomfort are largely avoided—eye shock is minimized—nervous and muscular tensions are lessened. Greater accuracies are possible—spoilage is reduced—accident rates are lowered—higher standards of production are realized.

Longer life...lower maintenance

Several additional values are built into Day-Brite CFI units: (1) Cooler operation and consequent longer lamp and ballast life result from natural updraft ventilation; (2) This updraft ventilation helps keep reflectors clean—less maintenance and more light value result.

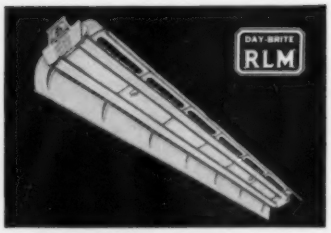
Two types of Day-Brite CFI fixtures

There are two types of Day-Brite CFI fixtures—the CFI-10, which provides for 10% *upward* lighting; the CFI-25, designed for 25% *upward* light distribution. Each of these fixtures is applicable to such installation surroundings as ceiling heights, wall and ceiling reflectances and the requirements of the visual task.

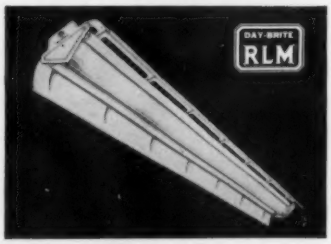
Take a look at the "comfort quotient" of the lighting in your plant. SEE, EXAMINE and COMPARE Day-Brite with any other lighting unit. Look at the fixtures, not just the pictures.

CALL YOUR DAY-BRITE LIGHTING REPRESENTATIVE. OR, SEND FOR CFI BULLETINS.

Day-Brite Lighting, Inc.,
5439 Bulwer Ave., St. Louis 7, Missouri



Day-Brite **CFI-10,** with 10% upward lighting component.



Day-Brite **CFI-25,** with 25% upward lighting component.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

5480

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

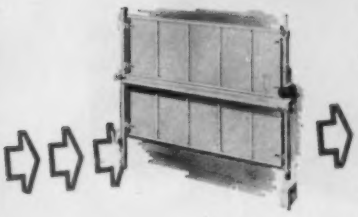
For more facts circle 553 on Reply Card

taking the extra stresses

Freight elevators need extra ruggedness of design to stand up under industrial power truck loading "punishment." The arrows in the diagrams at the left show how impact stresses vary when the elevator platform is level, below or above the landing. They also show the effects of a fast braking stop. These and the stresses of off-balance loading, and extra static loading are at work, not singly, but simultaneously and in endless combinations—as described in detail in Otis Heavy Duty Freight Elevators booklet B-705.

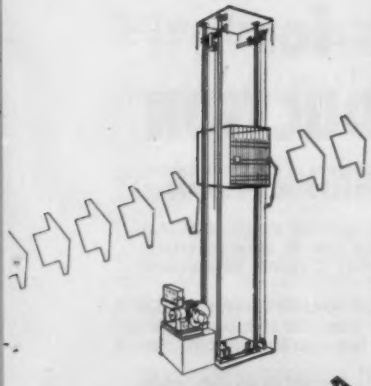
simplifying multi-floor handling

Freight elevators can easily be made to step up the efficiency of floor-to-floor production lines. The same electronic skill ***that developed automatic operatorless AUTOTRONIC® elevators for busy office buildings*** is ready to make completely automatic freight elevators an integral part of vertical production lines. This thinking can be applied to new buildings, to new elevators for existing buildings, and to modernizing outmoded light duty, general duty and heavy duty freight elevators.



time-saving hoistway doors

Otis power-operated biparting hoistway doors open while the car levels. This is a major time-saving feature. As compared with manual operation, automatic power operation is safer, quicker, smoother, and materially reduces round-trip time for busy freight elevators. The electric door operator does not depend on "coast" but drives the doors and car gates quietly to the fully opened and closed positions—as described in Otis Hoistway Doors booklet A-389 for new installations and modernization.



save costly building alterations

Otis Light Duty freight elevators have a semi self-supporting framework that permits installation in new and existing hoistways without reinforcing the building, or adding overhead supports, or building a penthouse. They can be used for any rise up to 35 feet at a speed of 25 feet per minute with lifting capacities of 1,500, 2,000 and 2,500 pounds. They're described in Otis booklet B-720.

value of a maker's pride

A perfectly performing installation is Otis' best salesman. That's why Otis maintenance is planned to keep elevators running like new—***year after year!*** Preventive maintenance is ***engineered service by the maker*** that prevents slowdowns and breakdowns; extends elevator life by 50%; eliminates expensive, unexpected repair bills; keeps replacement parts readily available; and provides 24-hour-a-day service on a nationwide basis with factory-and-field trained men that have a knowledge of elevatoring that can't be matched.

OTIS ELEVATOR COMPANY, 260 11th Ave., New York 1, N.Y.

OFFICES AND SERVICE IN 295 CITIES ACROSS THE U. S. AND CANADA

directional arrows

for MATERIALS HANDLING

Light, General and Heavy Duty FREIGHT ELEVATORS

DUMBWAITERS

HOISTWAY DOORS

MODERNIZATION

MAINTENANCE

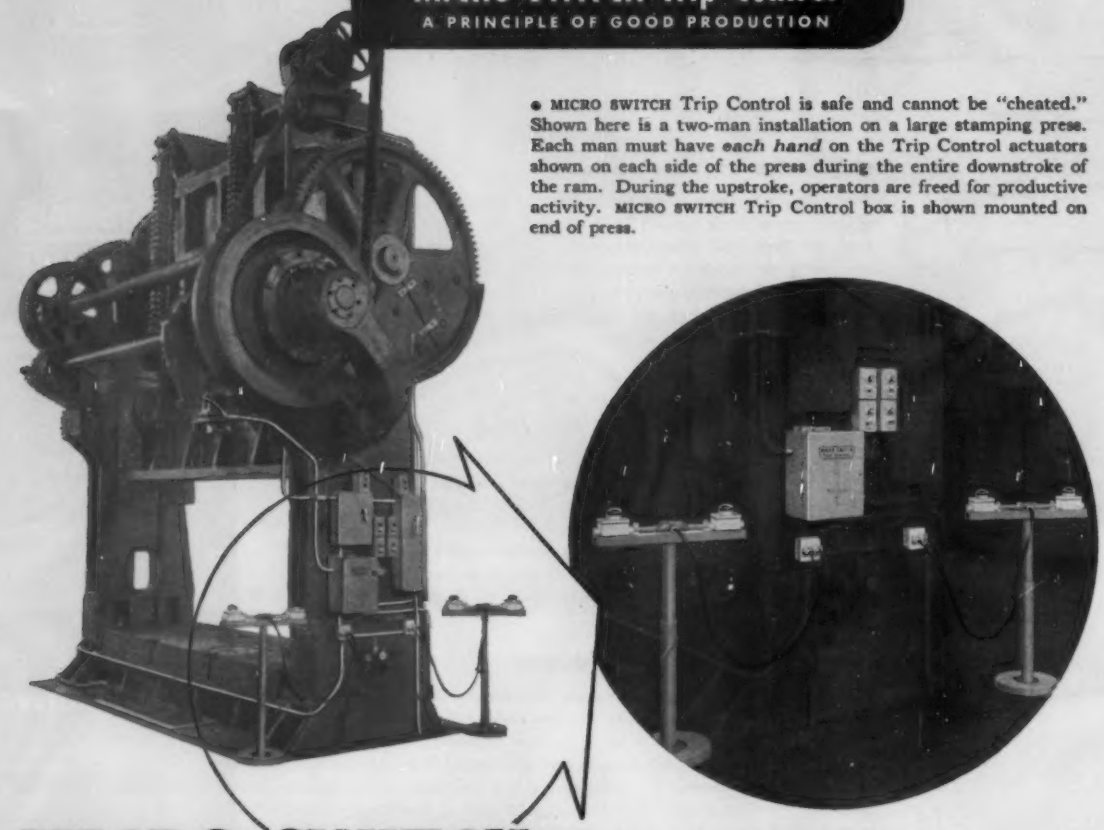
PASSENGER ELEVATORS

Otis

For more facts circle 554 on Reply Card

MICRO SWITCH Trip Control

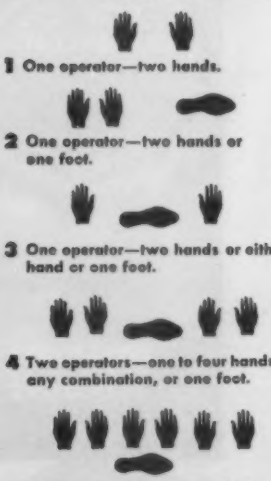
A PRINCIPLE OF GOOD PRODUCTION



• MICRO SWITCH Trip Control is safe and cannot be "cheated." Shown here is a two-man installation on a large stamping press. Each man must have *each hand* on the Trip Control actuators shown on each side of the press during the entire downstroke of the ram. During the upstroke, operators are freed for productive activity. MICRO SWITCH Trip Control box is shown mounted on end of press.

MICRO SWITCH Trip Controls for SAFETY and PRODUCTION

Wide Variety of Press Control Methods Available



1 One operator—two hands.

2 One operator—two hands or one foot.

3 One operator—two hands or either hand or one foot.

4 Two operators—one to four hands, any combination, or one foot.

5 Three operators—one to six hands, any combination, or one foot.

6 More than six hands, any combination, or one foot.

INCREASED PRODUCTION

Instant electrical response

•

Feather-touch operation

•

Easy control changes

•

Decreased operator fatigue

INCREASED SAFETY

Two hand operation

•

Cannot be "cheated"

•

Inoperable if any component fails

•

Interlock prevents power stroke while changing dies

• MICRO SWITCH Trip Control provides a means of electrical control for any manually operated power machine. Its use has resulted in production gains up to 20%.

Whether the machine is a small single-operator punch press or a giant stamping press, which may require four or more operators, equipped with MICRO SWITCH Trip Control it cannot be operated except as determined by the supervisor.

Certain types of runs require one of the operator's hands to hold work in position from outside the danger zone. In such cases, operation by one hand, or one hand and one foot, can be provided. (See chart.)

There is a simplified MICRO SWITCH Trip Control to provide single stroke control for positive mechanical-type clutches. Another affords automatic cycling control for friction-type clutches and hydraulic machines. Accessories include oil-tight snap-action push-button switches, rugged, heavy duty, precision limit switches, lockout switches, pilot lights, etc.

(For your convenience, MICRO SWITCH carries in stock a complete line of clutch actuators including solenoids, solenoid valves, and air cylinders, airline filters, lubricators, and pressure regulators which can be ordered with your MICRO SWITCH Trip Controls.)

For complete information on MICRO SWITCH Trip Controls and the name of the distributor near you call or write today.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

HONEYWELL

For more facts circle 555 on Reply Card

Fire-resistant, shatterproof panels

made with HETRON® polyester

Now available with U/L label

Even where strict fire codes must be observed, you can almost certainly meet safety requirements with these polyester daylighting panels. These are the *only* such panels now listed by Underwriters' Laboratories, Inc.

In exhaustive flame tests, these panels earned a flame spread rating of 75 or below in the U/L classification system. This compares with flame spread ratings of 100 for untreated red oak, and over 400 for some conventional non-fire-resistant polyester sheet.

These panels are "slow burning" materials as defined by Building Officials Conference of America. They will burn under a blowtorch flame, but snuff out as soon as the flame source is removed. They get this rating because they are made with HETRON, a Hooker fire-resistant polyester resin.

These panels give you not only fire resistance but *all* the advantages of cost-saving polyester construction – great strength, excellent light transmission, resistance to corrosion and rot, warpage and cracking. They are weather-resistant, and stable to sunlight.

These translucent panels, in many colors, both flat sheet and corrugated, are available from several fabricators. We shall be glad to supply you with their names.

For technical data on HETRON resins, write us.

EASY TO INSTALL. Just put sheet where you want daylight. For most industrial buildings, you need no special framing, no flashing or caulking. Panels shown are manufactured by Resolite Corp., Zelienople, Pa.

1905—Half a Century of Chemicals

From the Salt of the Earth—1955

HOOKER ELECTROCHEMICAL COMPANY

27 UNION STREET, NIAGARA FALLS, N. Y.

NIAGARA FALLS • TACOMA • MONTAGUE, MICH. • NEW YORK • CHICAGO • LOS ANGELES

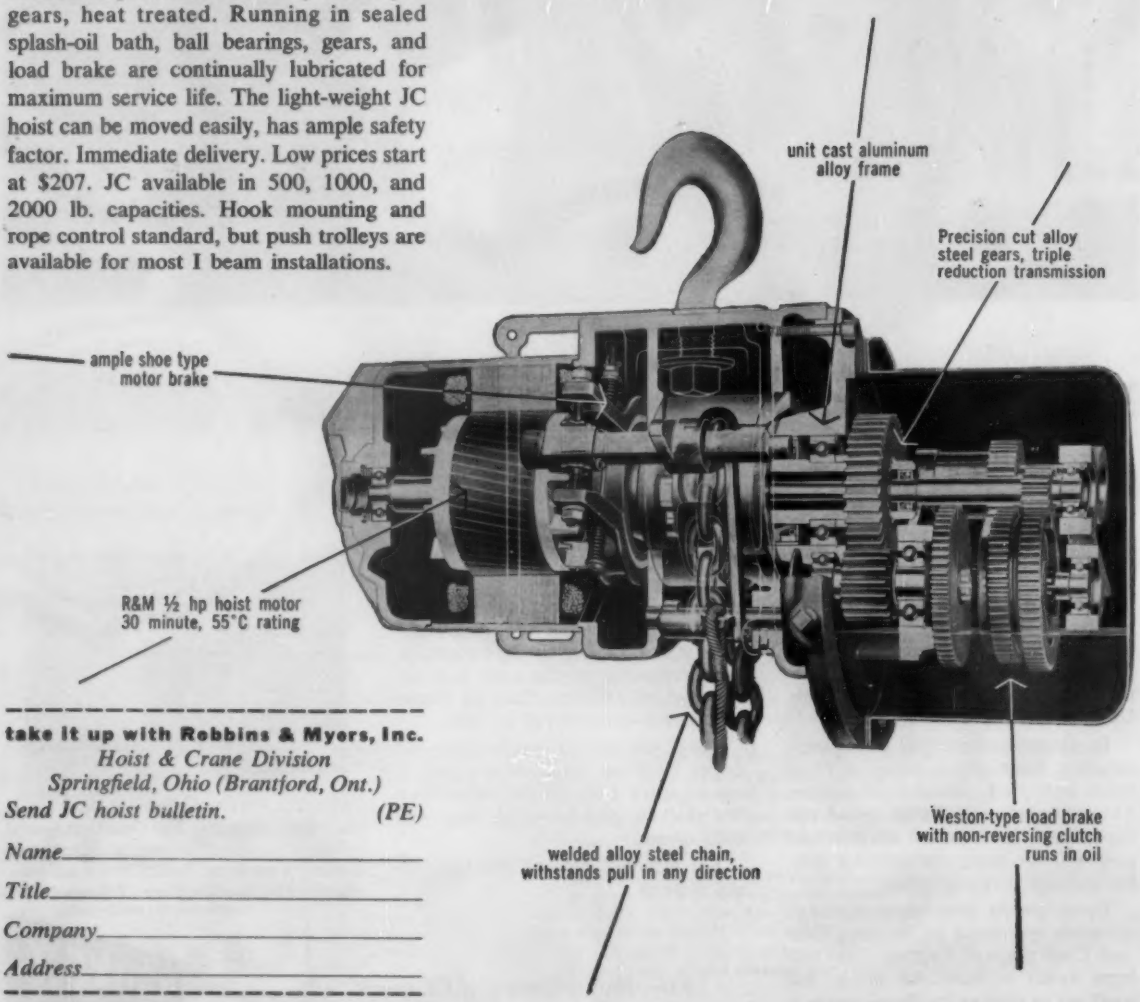
HOOKER CHEMICALS

S-2092

For more facts circle 556 on Reply Card

R&M JC chain hoists are ahead of competition in quality—right with it in price. See for yourself why more value for the same money is yours in the JC. The ½ hp R&M heavy duty motor is equipped with an oversize shoe brake to assure quick stops, accurate load spotting, longer life. Separate load brake is Weston-type, with non-reversing clutch to prevent drift. Gearing—triple reduction precision cut alloy steel spur gears, heat treated. Running in sealed splash-oil bath, ball bearings, gears, and load brake are continually lubricated for maximum service life. The light-weight JC hoist can be moved easily, has ample safety factor. Immediate delivery. Low prices start at $207. JC available in 500, 1000, and 2000 lb. capacities. Hook mounting and rope control standard, but push trolleys are available for most I beam installations.

quality to spare


unit cast aluminum alloy frame
Precision cut alloy steel gears, triple reduction transmission
ample shoe type motor brake
R&M ½ hp hoist motor 30 minute, 55°C rating
welded alloy steel chain, withstands pull in any direction
Weston-type load brake with non-reversing clutch runs in oil

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)
Send JC hoist bulletin. *(PE)*

*Name*_____

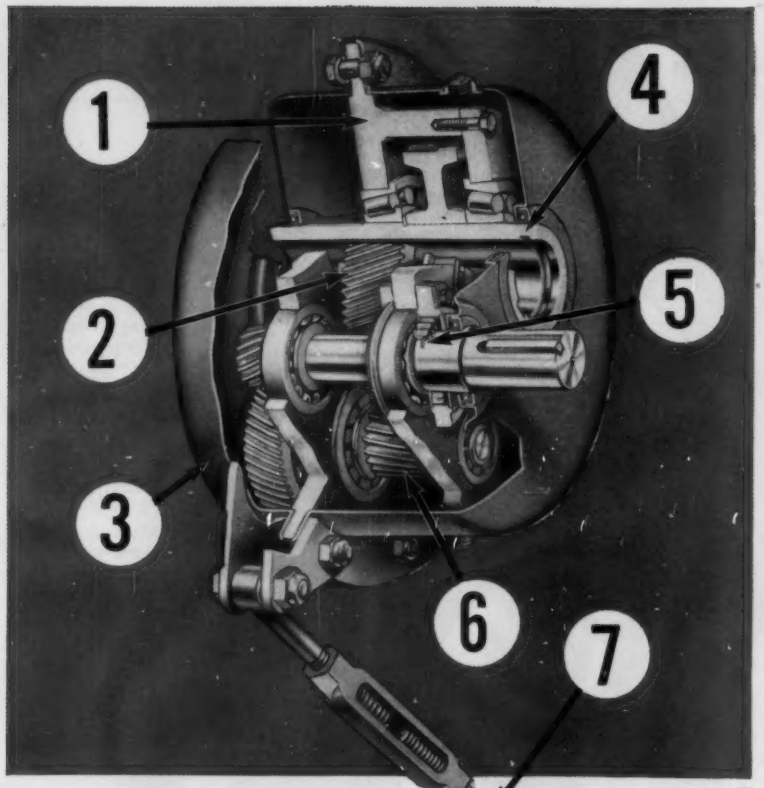
*Title*_____

*Company*_____

*Address*_____

ROBBINS & MYERS **hoists • cranes • winches**

For more facts circle 557 on Reply Card



Here is the "INSIDE INFORMATION" on FALK ALL-STEEL Shaft Mounted Drives

Take a careful look inside the Falk all-steel Shaft Mounted Drive, and you will know why this newest member of the famous Falk family is ideal for applications where direct mounting on the driven shaft is desirable. It is the only drive in its field with all these superior "In-built" factors:—

1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

5 **Backstop** can be furnished with the unit or added later for positive prevention of reverse rotation.

6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

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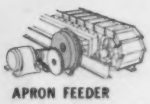
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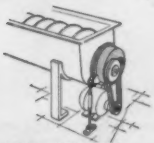
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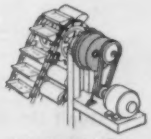
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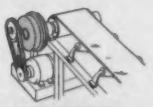
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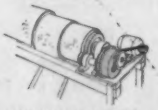
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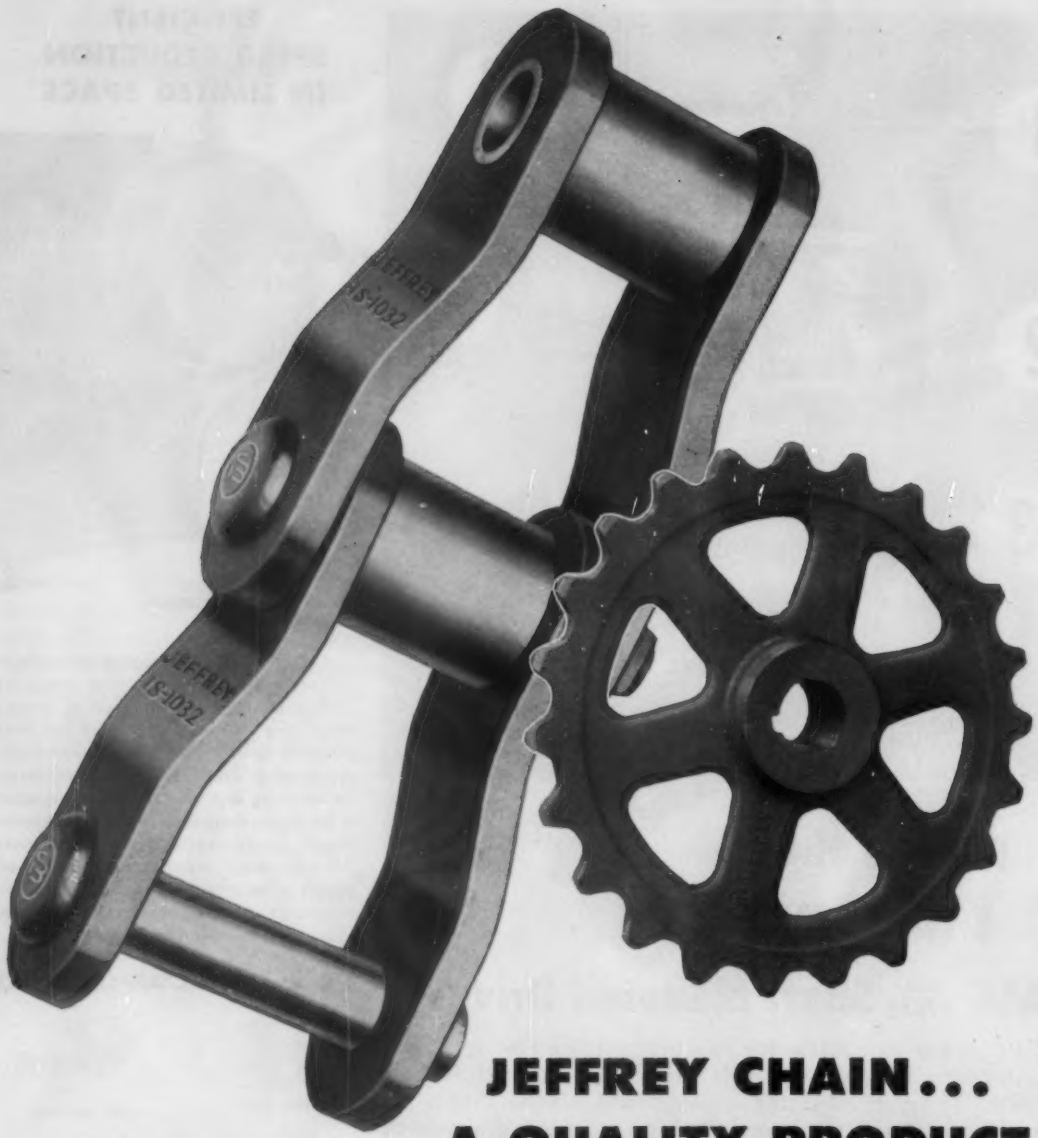

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by R. J. Bonthron, Mechanical Engineer

TRUSSES

A TRUSS is a structure composed of members or bars fastened together in the form of triangles, so as to resist change in shape. The purpose of a truss is to support a greater load or span a greater distance than any individual member from which the truss is built. It is a rigid structure in the sense that the elastic deformations are small—it is rigid as compared to a moving linkage in a mechanism. The simplest element of a rigid frame is a three bar pin-connected frame as shown in Fig. 1A.

A four bar frame, as shown in Fig. 1B is non-rigid, and would collapse toward the dotted position if acted upon by the forces shown. A truss consisting of triangular frames which do not overlap and in which no members cross each other is called a statically determinate or simple truss. If another member is added to a statically determinate truss, it will have more supporting members than necessary. Such a truss cannot be analyzed by the equations of static equilibrium alone, and hence is called a statically indeterminate truss.

If one member is removed from a statically determinate or simple truss, the resulting structure is unstable and in general will collapse. Figure 2 shows examples of statically determinate, statically indeterminate and unstable trusses.

In this article, only the simple truss will be analyzed. An unstable truss cannot be analyzed and the statically indeterminate truss must be treated by more advanced methods.

The following assumptions are made in our study of trusses:

1. All members of the truss and all loads acting on the truss lie in the same plane, generally the vertical plane.
2. All the joints are treated as pin connections.
3. All the loads are applied to the truss at the joints.
4. The weights of the members are negligible compared to the loads or one half of the weight is assumed to act at each end of the member.

As a result of these assumptions, the force system acting on each member of the truss consists of a force applied at either end of the member. When a body in equilibrium is acted upon by two and only two forces, those forces must lie along the line between the points where the forces are applied and must be equal and opposite. Such a member is called a two-force member.

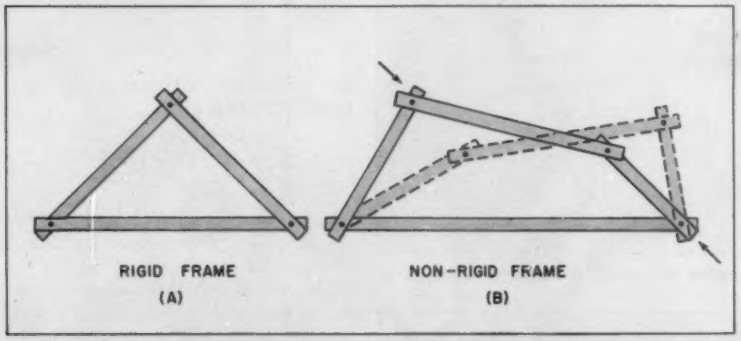

Fig. 1. Examples of truss structure. Three-member truss is rigid, other is not

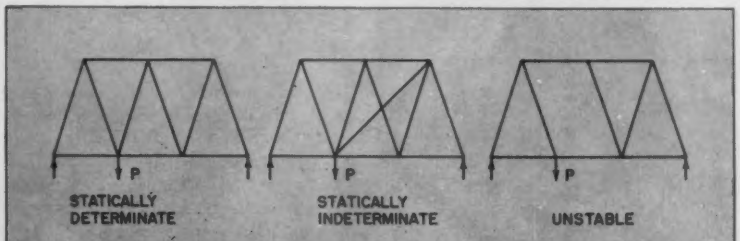

Fig. 2. Addition or removal of a member creates indeterminate or unstable state

The internal force in a two-force member is either tension or compression and is in the direction of the member.

The first step in the solution of any truss problem is to determine the reactions at the supports. In the example shown in Fig. 3 the reactions are computed as follows:

$\Sigma M_A = 0$
$6000(10) + 3000(20) - R_G(30) = 0$
$R_G = 4000$
$\Sigma M_G = 0$
$-6000(20) - 3000(10) + R_A(30) = 0$
$R_A = 5000$

The horizontal reaction at G is zero. The analysis begins with the isolation of joint A. Each member of the truss is a two-force member, and as such the internal forces at any point in the member consists of an axial force only, either tension or compression. These forces will be designated by subscripts of the lettered joints at each end of the member. In the following solutions the internal forces have been shown in directions in which they actually occur. It is not necessary that the unknown force be drawn in the correct direction in order to determine the correct value. If the unknown force is drawn in the correct direction, the solution of the equations of equilibrium will give a positive value. If the unknown is drawn in the wrong direction, the solution of the equations will give a negative value. This is true of all problems dealing with unknown forces. The equations of equilibrium yield:

$\Sigma F_Y = 0$
$5000 - F_{AB} \sin 60° = 0$
$F_{AB} = 5780$ lb compression
$\Sigma F_X = 0$
$F_{AC} - F_{AB} \cos 60° = 0$
$F_{AC} = 2890$ lb tension

The analysis by the method of joints produces a concurrent force system for which there are only two equations of equilibrium. Hence a joint can only be analyzed if there are two or less unknowns. One can not proceed now to joint C because there are still three unknown members at C. Instead one treats next the joint at B.

$\Sigma F_Y = 0$
$5780 \sin 60° - F_{BC} \sin 60° = 0$
$F_{BC} = 5780$ lb tension
$\Sigma F_X = 0$
$5780 \cos 60° + 5780 \cos 60° - F_{BD} = 0$
$F_{BD} = 5780$ lb compression

Now that the force in member BC has

been determined, the joint at C can be analyzed. The analysis of joint C determines the forces in members CD and CE, the computations at joint D produce the forces in DE and DF, the computations at joint E give the forces in EF and EG. There now remain two joints that have not been analyzed, four equations of equilibrium, and only one unknown, the force in member FG. The additional equations provide three separate checks.

Consider now the analysis of the truss shown in Fig. 4.

The reactions are determined as follows:

$\Sigma M_A = 0$

$4000(10) + 2000(30) - R_H(40) = 0$

$R_H = 2500$ lb

$\Sigma M_H = 0$

$-2000(10) - 4000(30) + R_A(40) = 0$

$R_A = 3500$ lb

The equations of equilibrium applied to joint A yield:

$\Sigma F_Y = 0$

$-F_{AB} \sin 45° + 3500 = 0$

$F_{AB} = 4950$ lb compression

$\Sigma F_X = 0$

$F_{AC} - F_{AB} \cos 45° = 0$

$F_{AC} = 3500$ lb tension

Joint C must be considered next, since it is the only joint, with the exception of H, at which there are only two unknowns. The equilibrium of joint C shows that F_{AB} is a tensile force of 3500 lb and F_{BC} is zero.

The force acting on joint B may now be computed and will give the following values: $F_{BE} = 707$ lb compression and $F_{BD} = 3000$ lb compression.

It is obvious from an inspection of joint D that the force in member DE is also zero.

The question often arises as to whether or not the two zero members are necessary. The zero member BC could be omitted in this truss provided the loading was not changed because the members AC and CE, being in tension, would remain stable. Due to the weights of members AC and CE, joint C would drop a small amount so that the members would not be exactly horizontal. If an appreciable vertical load were applied at point C, the truss would collapse. The zero member DE is essential to maintain a stable truss under the given loading. The compression members BD and DF would buckle, with point D moving vertically upward or downward, if the member DE were removed. A close study of the truss will also reveal that if BD and DF are not exactly parallel, the force in the member DE will not be zero. To maintain a stable truss under all types of loading, all members of the truss are of course necessary. Even if the loading is unchanging, zero members should not be omitted, but may be designed to carry very small loads.

Normally a truss is supported at each end, rather than having an overhanging span. Also, the loading on a truss generally consists of many forces due to weights and as such are vertically downward. Therefore, in most cases the greatest single load on the truss is one of the reactions at the end. This was not true of the examples considered so far because the number of loads has been small and symmetry of loading has been avoided. It will be noted however that the force in the diagonal member at the end support is as large or larger than the force in any member of the truss in both examples. This end diagonal member frequently carries the greatest force of all the members of the truss. Consider the forces acting on an end support where there is a vertical reaction, an inclined compression member and a horizontal tension member, such as shown in Fig. 3. The vertical reaction will be called R, the force in the inclined member F_{AB}, the force in the horizontal member F_{AC}, and the angle between the horizontal and vertical member Θ. The summation of the forces in the vertical direction gives:

$$-F_{AB} \sin \Theta + R = 0; \quad F_{AB} = \frac{R}{\sin \Theta}$$

The summation of forces in the horizontal direction give:

$F_{AC} - F_{AB} \cos \Theta = 0;$

$F_{AC} - F_{AB} \cos \Theta =$

$$\frac{R \cos \Theta}{\sin \Theta} = \frac{R}{\tan \Theta}$$

As the angle Θ increases, the values of F_{AB} and F_{AC} decrease, and as the angle decreases, the values of the forces increase.

As the angle approaches zero, the forces in members AB and AC approach infinity.

The graphic solution of the forces acting at point A, Fig. 5, show this fact very clearly.

The three forces acting at joint A are in equilibrium and their vector representation must form a closed triangle. The magnitude and direction of R are fixed and the direction of F_{AC} is fixed. Hence the magnitudes of F_{AC} and F_{AB} depend on the angle Θ alone. Three possible solutions are shown for three angles Θ_1, Θ_2, and Θ_3.

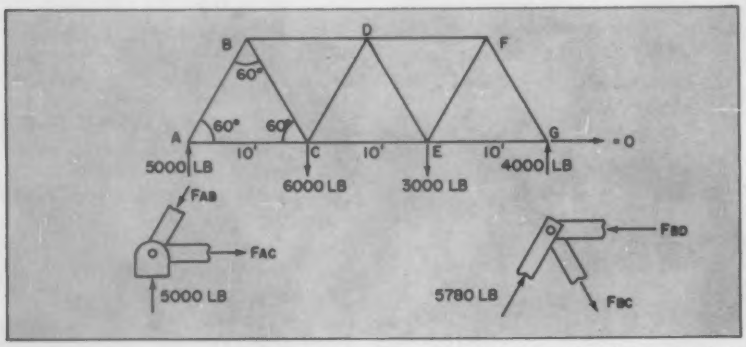

Fig. 3. Truss structure, as analyzed by method of joints. Insets, Joints A and B

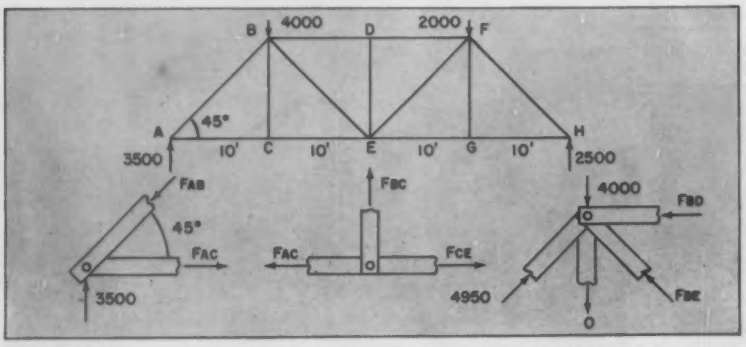

Fig. 4. Truss shown is analyzed in text. Insets (l to r) are joints A, C and B

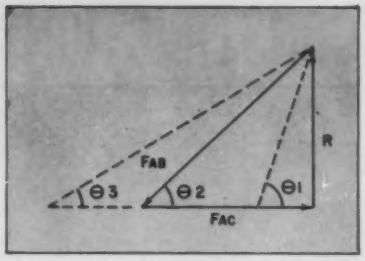

Fig. 5. Graphical solution of joint

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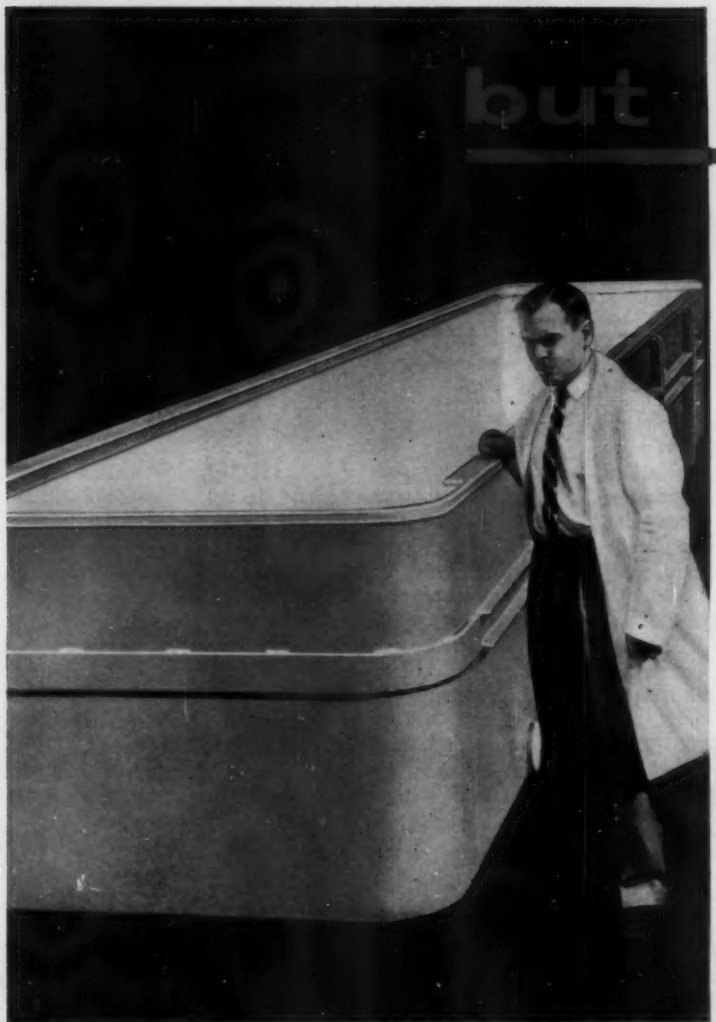

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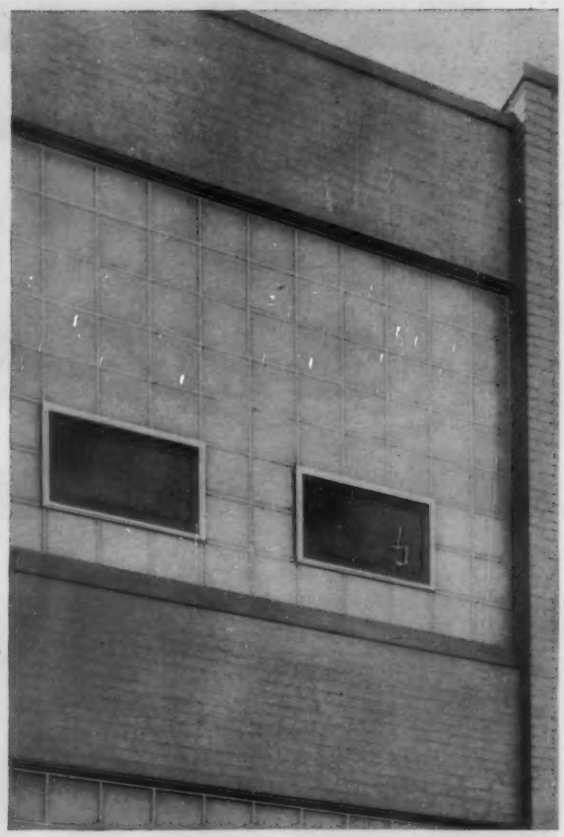

How to eliminate recurring window maintenance

If you have experienced maintenance problems with windows like those at left above, you know only too well that the first repair job is never the last. Encrusted paint blisters and peels. Moisture builds up rust formations and warping and buckling soon follow causing window breakage. Putty loosens and calking pulls away. The discouraging thing is that the repairs, which don't really cure the basic headache, bring only temporary relief from costly maintenance.

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PC FUNCTIONAL GLASS BLOCKS ARE TRUE OPTICAL UNITS

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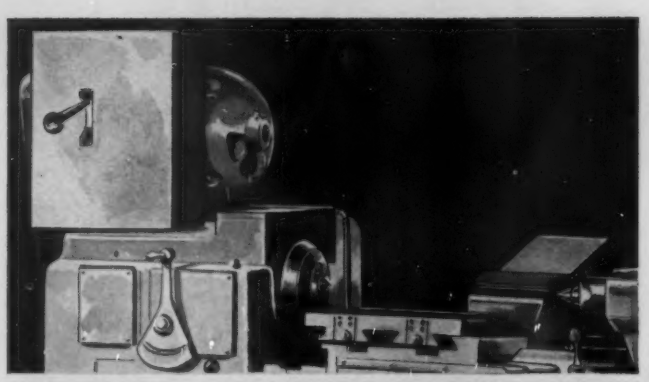

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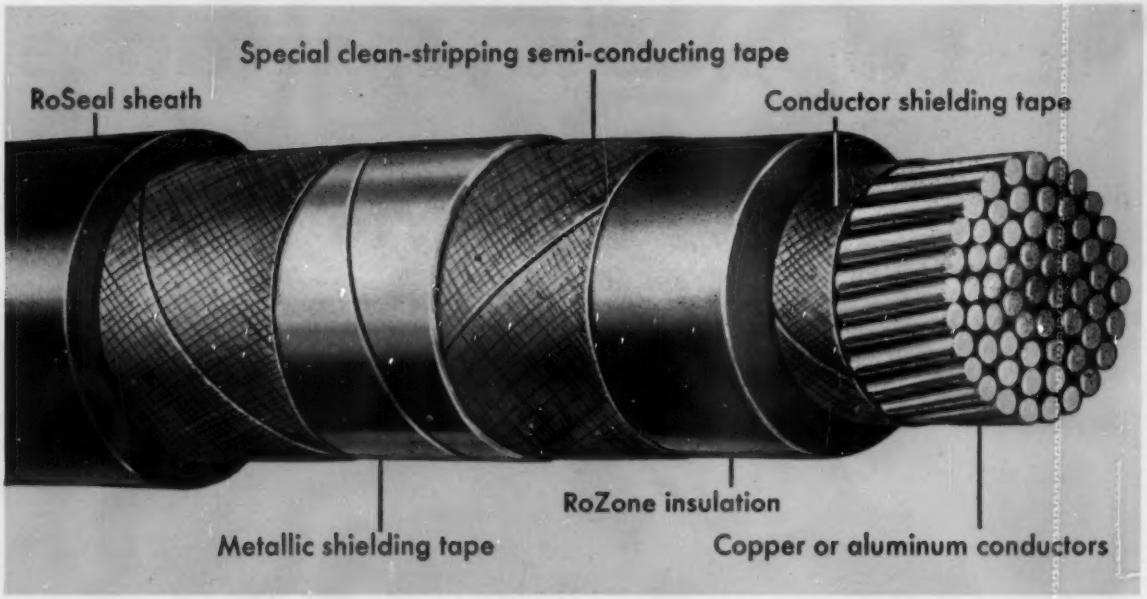

RoZone-RoSeal shielded power cable for high-voltage applications through 15 kv

What this new high-voltage construction gives you

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A. It's Rome Cable's trade name for a special flame-resistant polyethylene compound, presently recommended as a nonmetallic sheath for rubber-insulated, shielded power cables rated up to 15 kv.

Q. What are some of the important operating advantages of RoSeal?

A. 1. Exceptional moisture resistance.

2. Resistance to weathering and soil conditions.
3. Easy pulling (RoSeal's coefficient of friction is much lower than that of any other sheathing material because of its waxy structure).
4. Good abrasion resistance.
5. Durability and long life.
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9. Inherently high corona levels on finished cable.
10. Low cost as a sheath for shielded rubber-insulated power cable.

Q. What experience is there on RoSeal?

A. Rome Cable initiated development in 1949 and began commercial usage over 2 years ago. There are now satisfactory installations in utilities, chemical plants, oil refineries and industry. The performance of a well-known similar sheath used on millions of feet of paper telephone cable for the last 7 years—in the air and underground—has been outstanding. RoSeal is similar to this sheath *except* that flame resistance has been incorporated.

Q. Where can you use RoSeal sheathed cable?

A. Use it in virtually *any* location—in the air, conduit, ducts, direct in earth, or even in water.

Q. How do you splice RoZone-RoSeal power cable?

A. Installation procedure is the same as with Neoprene sheathed cable except that you use a thermoplastic tape in place of Neoprene tape, since RoSeal is a thermoplastic.

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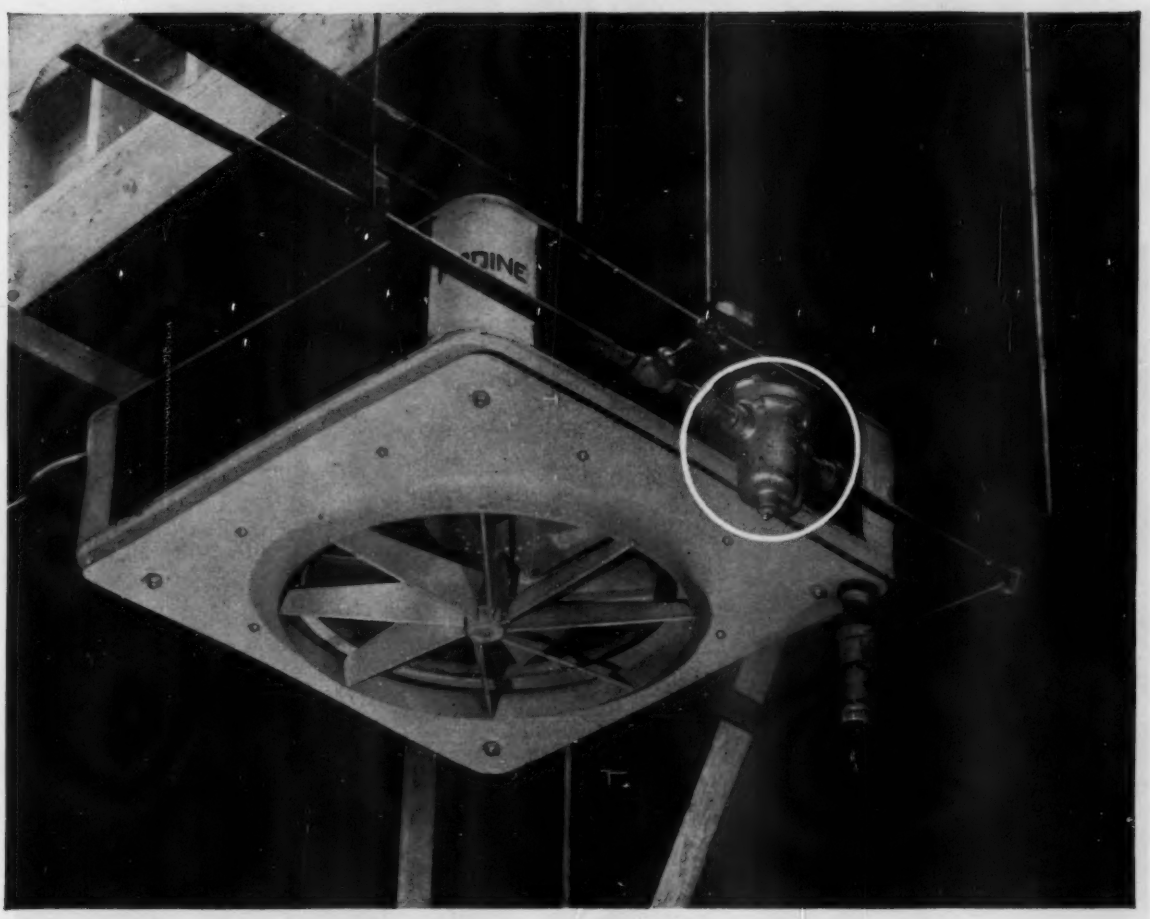

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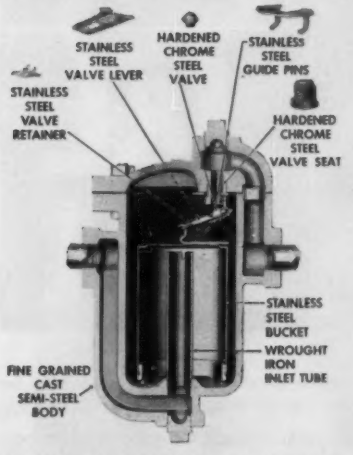
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FINE GRAINED CAST SEMI-STEEL BODY

Good Traps. The mechanisms in Armstrong traps for unit heaters are substantially identical in design, workmanship and materials to those used in traps for 900 lbs. pressure, 900 degrees F.

Cause. Costly corrosion of unit heaters is frequently the result of sluggish condensate drainage and inadequate venting. Any carbon dioxide gas present in the steam supply will go into solution if the condensate is below steam temperature, forming corrosive carbonic acid. Presence of oxygen aggravates the corrosion.

Remedy. Armstrong traps prevent carbonic acid formation because they discharge condensate *at steam temperature* and vent CO_2 and air at the same time. There is never any accumulation of condensate and incondensible gases to cause trouble as can occur with traps that must wait for condensate to cool before they will open.

Trap Selection. It is important that the traps be correctly sized, with a generous safety factor to provide adequate air handling capacity. Armstrong sizing recommedations are thoroughly reliable, being based on actual performance of the traps under operating conditions rather than on theoretical considerations.

Complete Details. Ask for Armstrong Bulletin No. 2312 which tells how to select and install traps for any type of unit heater. For your free copy, call your local Armstrong Factory Representative, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

ARMSTRONG STEAM TRAPS *Application Engineered*

For more facts circle 566 on Reply Card

NEAT WAY TO PLAY SAFE: JAL-TREAD FLOOR PLATE

Jal-Tread floor plate combines the strength and durability of high quality steel with a neat, distinctive checkerboard pattern scientifically designed for *safety*.

Whatever your application . . . in new construction . . . new equipment . . . or replacement jobs, Jal-Tread will assure you of these advantages:

Safe Footing—300 miniature squares per square foot—all of uniform height—provide maximum linear friction surface that protects you against lost-time accidents.

Easy Fabrication—The Jal-Tread straight line pattern simplifies welding, flanging, shearing, bending, punching, and drilling operations. Experience shows that Jal-Tread can be cold-formed on standard plate bending machines.

Easy Cleaning—The Jal-Tread straight line gutter pattern permits quick, thorough sweeping and draining in any direction.

For safe, long-lasting flooring always specify J&L Jal-Tread . . . *it's available at leading distributors everywhere.*

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ARCHITECTURAL FILE
or write for copy

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

For more facts circle 567 on Reply Card

No. of Fixtures	Types of Fixtures		Savings
9100	3-150A and 1-H400-A1	R-52 (750W)	
Lamp cost per year	$148,065	$105,560	$ 42,505
Replacement cost	229,903	27,300	202,603
Cleaning cost	18,200	—0—	18,200
Power cost	477,720	407,500	70,220
Ballast replacement	14,544	—0—	14,544
Annual Costs	$888,432	$540,360	
Annual Savings			$348,072

No. of Fixtures	Types of Fixtures		Savings
500	3-150A and 1-H400-A1	R-52 (500W)	
Lamp cost per year	$ 8,135	$ 5,460	$ 2,675
Replacement cost	12,637	1,500	11,137
Cleaning cost	1,000	—0—	1,000
Power cost	26,280	15,000	11,280
Ballast replacement	768	—0—	768
Annual Costs	$ 48,820	$ 21,960	
Annual Savings			$ 26,860
Grand Total Annual Costs	$937,252	$562,320	
Grand Total Annual Savings			$374,932

Tabulation compares the operating costs of the new lighting system over the mercury-vapor-incandescent unit and shows the savings the company has realized from this conversion

One Lamp Does the Work of Four

Saves Ford Motor Co. $374,932 Annually

BEFORE THE conversion, Ford Motor Co. used to spend about $937,252 a year to light its sprawling aircraft engine plant on Chicago's south side. Today, the firm saves $374,932 annually, gets improved and more pleasing light, far more production efficiency and happier employees in the bargain.

The change was brought about by switching light fixtures: the old unit consisted of a mercury-vapor lamp and three incandescent lamps which were rated at a total of 850 w, the new fixture (GE's Model R-52) has one incandescent lamp rated at 750 w.

Fig. 1. Chief electrician, W. Brockway, Ford Motor Co., supports old unit, while H. B. Heitzman, General Electric engineer, holds one of the new lamps

The three incandescent lamps in each of the old fixtures had an average life of 750 hours, required replacement 10 times a year. The mercury-vapor units had an average life of 4,000 hours, came out twice a year. Cost of the new lamps totaled almost $160,000 a year.

To clean and replace lights, Ford needed special equipment, a comparatively large maintenance force, and a lot of time. The equipment consisted of a 4 by 6 ft "crow's nest" with an extension ladder on it, which was pulled by a plant tractor. At each light, n member of the maintenance crew would have to climb the ladder to the height of the fixture (18-21) ft above the floor), clean the glassware and/or replace bulbs, then scoot down and repeat the operation at the next fixture. Each fixture seldom took less than 20 minutes, and required a maintenance force of 14 to 16 men.

When you are operating an 84-acre plant, such troubles can be expensive.

Fig. 2. Scaffold was formerly used to maintain the old fixtures. Now, it is employed to install the new lamp units

Fig. 3. Scaffolding is no longer needed to replace new units. All that is required is pole-changer and cart for extra lamps

To light this plant 9,600 fixtures are required. Before the switch, that meant maintaining 28,800 incandescent and 9,600 mercury-vapor lamps. Just by decreasing the power input per fixture, from 850 to 750 w, the company cut its electric bill $81,500, from $504,000 to $422,500 a year.

Another big advantage of the new fixture is that the bottom of the lamp bowl—the area through which most of the light passes—doesn't get dirty. Dirt collects on the rest of the bowl, true, but the inside of this area is coated with a reflecting material. So, in effect, the amount of dirt getting in the way of the light beam is virtually nil.

New Lamp Eliminates Cleaning

Because of this lamp construction, the new lamps never have to be cleaned. Elimination of this chore has cut costs $19,200 a year, according to G. H. Jordan, Ford's general superintendent of maintenance.

Lamp replacement cost also has been cut. The new incandescent fixture has a service life of 2,000 hours, compared to 750 hours for the old incandescent and 4,000 hours for the mercury-vapor units. Also, the new lamps can be replaced in about five minutes, instead of 20. One man does the job, standing on the floor and using a pole-changer. Instead of the tractor, crow's nest, and extension ladder, all he needs is a small cart to hold extra lamps.

Thanks to these improvements, Ford has been able to cut the size of its light maintenance crew by 66 per cent. This saving, together with the reduced investment in lamps, comes to about $260,000 a year.

Switching from an incandescent-mercury-vapor system to a strictly incandescent system produced another sizable economy. Before the change, each fixture required a ballast. Occasionally, ballasts had to be replaced. With the new incandescent lamp, no ballast is needed, and neither is the $15,000 that used to be required annually for ballast replacement.

Thanks at least partially to the new lighting installation, there has been an improvement in manufacturing efficiency. Although figures are unavailable, production per man hour has been substantially increased, rejects and accidents have been substantially decreased.

One example of this is in the plating room. Under the old lighting system it was impossible to see the parts suspended in the liquids. Now, with the new lights, one can see into every corner of the plating baths and the safety factor has been improved.

Another area was under the conveyors where the foot-candle level was increased in many instances from 8 or 10 to 20 and 25 ft-c. Yet no fixtures were added and the total wattage consumption is less than before. Painting the truss work on these conveyors has contributed to this increase, but the major part is simply due to the new filament system.

15 Minute Conversion

In planning the conversion, the company handled it as a routine maintenance and cleaning schedule and, in this manner, converted about 30 fixtures a day. A two-man team requires about 15 minutes to change a fixture. One, working from a movable scaffolding, detaches the old fixture, lowers it to the other man who removes the reflector, the lamps and the unnecessary wires. After this is done, he inserts a 750 w R-52 lamp and sends it back to the man on the scaffold.

The old filament lamps are discarded, the mercury lamps are saved for use in areas not yet converted. Ballasts are left in place but, of course, are no longer needed. In certain areas, over storage bins, they have installed 500 w R-52 lamps in the same manner. There are only 500 of these, but they do have some effect on the costs and savings pictures as can be seen in the tabulation.

Summing it all up, Ford officials feel the cost of the new installation has been justified by: reduced power cost, lower maintenance expense, and the increased visibility.

Dry Wall Construction Maintains Even Temperature In Cold Rooms

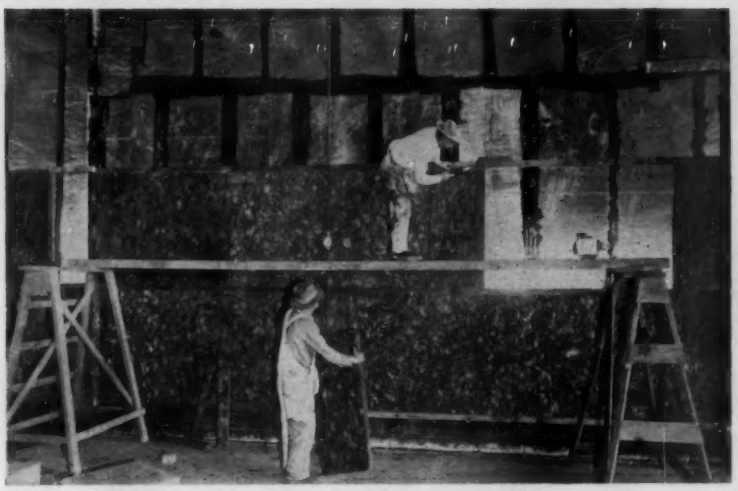


Fig. 1. After spraying side walls with adhesive and applying aluminum foil, the men install first layer of insulation, second layer and wire mesh will follow

Fig. 2. Photo shows three steps: aluminum foil and two layers of insulation

CONTROLLING THE temperature in cold rooms is more accurate thanks to the use of a new dry wall construction. This dry wall method was used in the $20,000,000 Anheuser-Busch brewery in Los Angeles, California.

Its use prevents moisture from remaining in the insulation, thereby insuring maximum efficiency. It also permits erection of wall insulation without use of hot asphalt and its attendant dangers and provides for use of practical interior finish of cement asbestos board.

A total of 1,307,579 board feet of Fiberglas insulation weighing approximately 1,250,000 lb was installed in the stock, cellars and brew house to assist in maintaining average temperatures of 35 F in the cold rooms.

The insulation is inert and will not support the growth of yeast spores or other forms of mold. This is helpful in maintaining cleanliness which is important in a brewery. The cement asbestos board used on the inside finish on most areas is also an inert material. It does not require painting and results in a smooth interior surface.

This type of construction makes it possible to remove any wall section and salvage all of the insulation and finished surface materials. For this reason, alterations can be made with greater economy, and repairs to either vapor seal or finished surfaces can be made readily.

Before installing the insulation, the interior concrete walls of the cold rooms were sprayed with a non-inflammable, water-base asphalt emulsion. When this preparation was tacky, aluminum foil 0.003 in. thick, was pressed onto the adhesive. This forms the vapor seal which keeps insulation dry under all conditions. All end and side joints were lapped about three inches and cemented.

How Insulation is Applied

Horizontal furring strips of treated wood, two by three inches and spaced at 48-in. intervals, were fastened to walls by drive bolts. The first layer of insulation was pressed between the strips.

A second layer of two-in. thick furring strips was attached vertically to the first strips with heavy burred nails on 24-in. centers. Another layer of the insulation board was pressed between these strips to provide a total thickness of four inches of insulation.

The finish in most corridors and passageways is ceramic tile over a scratch coat of cement plaster. The plaster was applied over 1½-in. galvanized mesh attached to the vertical furring strips.

Perimeter insulation for the floors consisted of two layers of two-inch thick Fiberglas asphalt-enclosed floor board. A vapor seal of 15 lb felt was laid in the insulation adhesive over the sub floor and up on the side walls about 18 in. The insulation was cemented to the vapor seal and then covered with a water seal of 15 lb felt laid in the insulation adhesive. A perimeter insulation, the same type construction as the side walls, was applied approximately four feet wide from the top of the side wall insulation out under the roof slab.

Three layers of roof insulation (two of two-inch each and one, one-inch thick) for a total of five inches were installed over refrigerated areas. Each layer was mopped down and all edges sealed with hot asphalt. The roof was built up with several plies of 15 lb felt laid in hot coal tar. The finish is white gravel spread in hot tar.

Holmes & Narver, Inc., Los Angeles, was the engineer and architect; Meyers and Evers, San Francisco, consulting architects; Peck-Cahill Co., Los Angeles, general contractor; and Fiberglas Engineering and Supply Co., Los Angeles, insulation contractor.

Controlling Obsolescence of Maintenance Parts

How Kaiser Steel Cut $1,000,000 Off Stores Inventory

"OBSOLESCENCE PREVENTION"—make a note of that phrase.

Why? Because it's a new dimension in maintenance warehousing, a revolutionary concept which can save your plant thousands of dollars.

How? By detecting obsolescence in your maintenance spares—and by anticipating and drastically minimizing—future obsolescence.

"Obsolescence Prevention" has done just that for Kaiser Steel Corporation's Fontana, California, plant.

Altho the program was adopted only a little over a year ago—in Feb. 1954—it has already allowed Kaiser to (1) reduce its stock of obsolete maintenance parts and forestall future surpluses; (2) save thousands of dollars; (3) cut its spares inventory by a whopping $1,000,000, while at the same time reducing risk of a zero balance in any item.

"Obsolescence Prevention," while hewing strictly to the theme that there's no excuse (save a drastic realignment of machine function) for a zero balance in any category, nonetheless redefines "obsolescence." For Kaiser, obsolescence means much more than a mere numerical accounting—so many parts surplus. It means a dollars and cents evaluation.

When Kaiser's maintenance staff and warehousemen talk of obsolescence, they speak in terms of dollars.

Says a Kaiser maintenance engineer realistically, "The warehouse is our bank . . . a bank capitalized with $8,000,000 worth of spares, about 70,000 different items. Every spare that grows obsolete is a drain on the bank's resources."

This concept applies to any plant's maintenance stock—whether a thousand dollar's or $8 million's worth, as at Kaiser.

Basis for this evaluation is a strict accounting set-up: every one of the warehouse's 70,000 different maintenance parts has its own ledger account—like a bank's. Weekly, every account is balanced—given a definite dollars-cents value. Each is machine-posted, the information sorted, the account's activity (withdrawals and additions) tallied.

Secondly, these 70,000 "accounts"—each set up according to the spare's catalog number—are segregated according to the item's per unit value. Kaiser's maintenance warehousemen know, for example, that but 8 to 10 per cent of their spares represent fully 70 per cent of the "bank's" total investment. That is, 6000 to 7000 items involve an investment of about $5,600,000. These "select items" are closely watched, for an obsolescence in any one of them can involve a high dollar loss. Select items are usually valued at $50 or more.

Thus the fundamental concept in Kaiser's banking system: that dollar obsolescence is a more realistic approach to spares obsolescence than a purely numerical accounting.

From this point, the theory grows more complicated.

Kaiser warehousemen asked them-

selves some questions. Why, for instance, do spares grow obsolete? Well, for one thing, the warehouse (and purchasing) may not be tied closely enough to maintenance and plant engineering. An engineering change may throw many categories of spares (thus many ledger-accounts) into obsolescence. That's why Kaiser's Stores Superintendent weekly sits in on the plant's maintenance meeting. He learns of pending changes. He can evaluate these changes as they threaten to obsolete his spares.

Maintenance stockmen delved deeper. Does the average plant maintenance man, requesting purchase of a part, realize his request's implication as to dollar obsolescence?

Warehousemen doubted the average maintenance man did. For the average maintainer wants to assure himself a continual supply of a part. He tends to overorder.

Thus, Kaiser adopted a unique query—the "Request for Purchase" form, abbreviated RFP.

When a maintenance man requests a parts purchase, he must at the same time answer some questions. All are gaged to detect obsolescence, both present and future. He must specify: "Why is the item being reordered?" "What is approximate life of ordered material?" "Is part used anywhere else in the plant?" "Does item replace material now in stock? If so, what material?" "If answer is yes, what disposition should be made of present stock?"

Let's analyze these questions as they pertain to your own stock rooms, large or small. First, "Why is item being reordered?" Kaiser isn't looking for the obvious, like, "because machine No. 345 needs a new bearing." They're looking for clues. What's the matter with that particular bearing? Isn't it holding up as it should? If not, reordering might only cause future obsolescence from a dollars-cents point of view. If the bearing needs too frequent replacement, then it's a problem for the plant's Materials Research department. Materials Research should be called in. Its experts should analyze the part. If need be, they may contact the manufacturer, request design changes.

It's Upkeep That Hurts

Kaiser, for example, would gladly pay $1.00 for a bearing that lasted six months rather than stock 50-cent bearings which need replacement every few weeks. For in Kaiser's theory—and in practice—spares may become "dollar obsolete" on the basic of economics. Example: if a part involves too much maintenance labor, must too often be replaced. Thus, if the maintenance man's answer to that first RFP question indicates future obsolescence on the basis of labor costs, the warehouse wants to know about it.

Take another question, "What is approximate life of ordered material?"

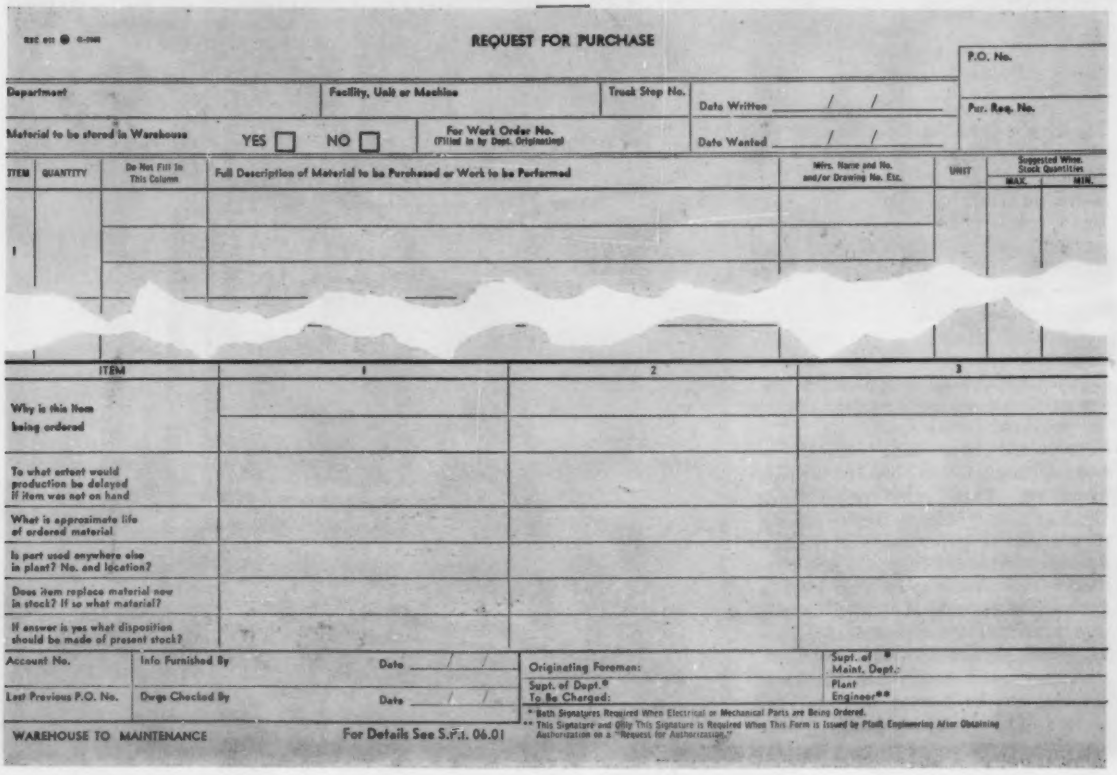
While this question may seem to overlap the first, actually it's pointed in another direction—aimed at anticipating "dollar obsolescence." Suppose the maintenance man says the part should last a year and he orders ten parts. But engineering reports indicate that the machine involved has a life-expectancy of only five more years. What have we here? We've got a request for a ten years' supply of an item while the machine it fits can be expected to last but half that long.

A couple of pointed questions have forestalled a serious investment—a drain on the stockroom's capitalization.

With the "Request for Purchase" form in hand, warehouse clerks compile a minutely detailed description of the requested item. The description is punched into a tab card. Every one of the 70,000 account cards are sorted, searching for stocked parts which duplicate or closely resemble the part requested.

How is this done? Punched into the card is the part's description—very detailed. When the plant engineer or

This is Kaiser's "Request for Purchase" form. When maintenance re-orders spare parts it must do some mind-searching



REQUEST FOR PURCHASE

P.O. No.

Department | Facility, Unit or Machine | Truck Stop No. | Date Written ___/___/___ | Pur. Req. No.

Material to be stored in Warehouse YES ☐ NO ☐ | For Work Order No. (Filled in by Dept. Originating) | Date Wanted ___/___/___

ITEM	QUANTITY	Do Not Fill In This Column	Full Description of Material to be Purchased or Work to be Performed	Mfrs. Name and No. and/or Drawing No. Etc.	UNIT	Suggested Whse. Stock Quantities MAX.	MIN.
1							

ITEM	1	2	3
Why is this item being ordered			
To what extent would production be delayed if item was not on hand			
What is approximate life of ordered material			
Is part used anywhere else in plant? No. and location?			
Does item replace material now in stock? If so what material?			
If answer is yes what disposition should be made of present stock?			

Account No. | Info Furnished By | Date ___/___/___ | Originating Foreman: | Supt. of * Maint. Dept.

Last Previous P.O. No. | Dwgs Checked By | Date ___/___/___ | Supt. of Dept.* To Be Charged: | Plant Engineer**

WAREHOUSE TO MAINTENANCE — For Details See S.P.I. 06.01

* Both Signatures Required When Electrical or Mechanical Parts are Being Ordered.

** This Signature and Only This Signature is Required When This Form is Issued by Plant Engineering After Obtaining Authorization on a "Request for Authorization."

the superintendent of maintenance wants parts these are requested on an RMI form. The warehouse then runs a sorting operation on its 70,000 cards —representing 70,000 spare parts. The sorting machine is set up, of course, to pull out any cards (and thus parts) which closely resemble the part requested. In this way, duplication is often caught before it occurs. Sometimes, parts are found already in stock which match the request. Or they so closely resemble it that they can be substituted for the requested part.

Thousands of parts have been saved from overordering—and obsolescence —through this kind of sleuthing.

But more than the "Request for Purchase" form is involved.

Another essential form is the "Request for Material Information"—abbreviated RMI.

This questionnaire has a different, although paralleling purpose. The RMI form is directed to engineering, and is often accompanied by a blueprint of the item. RMI forms gather information about a single cataloged item.

Maintenance warehousing knows from the Request for Purchase form that a plant maintenance man wants stockmen to order a specific part. A search of other accounts (by machine tabulation) has shown that no bearing in stock fits the need. It would seem logical for the warehouse to approve the order—but not before it has been evaluated on the basis of the RMI form.

Pointed Questions

Some questions asked by the RMI: "Is the above description and attached blueprint of the item correct?" That is, does the part match specs. Kaiser wants to risk no obsolescence thru faulty specs. Another question: "Are any engineering changes pending?" That's important, too, in predicting future obsolescence.

With all these facts in hand, Kaiser's maintenance stockroom can draw up a purchase formula for the part—a formula which takes into consideration the part's current use, its serviceability, its predicted future need.

It would have been simpler, of course, merely to have ordered the part requested. That's what most plants do. But Kaiser believes they're making a mistake. Further, says Kaiser, a spares purchase formula which considers only use-history can cost a company thousands of wasted dollars. For a part can be economically obsolete when physically, it's serviceable.

A part, even though it is still serviceable, can be "dollar obsolete" because: (1) identical parts can be bought cheaper on the current market; (2) the part requires too much labor to install and maintain; (3) the cost of procuring and carrying it is too high; (4) a more serviceable part is available, but the stockroom is stuck with a large supply of the old part, because it made the mistake of buying on the basis of a price break, discovered too late that buying for the price break seldom makes economic sense (except for very low value spares where the cost of ordering and stocking is greater than the part's value).

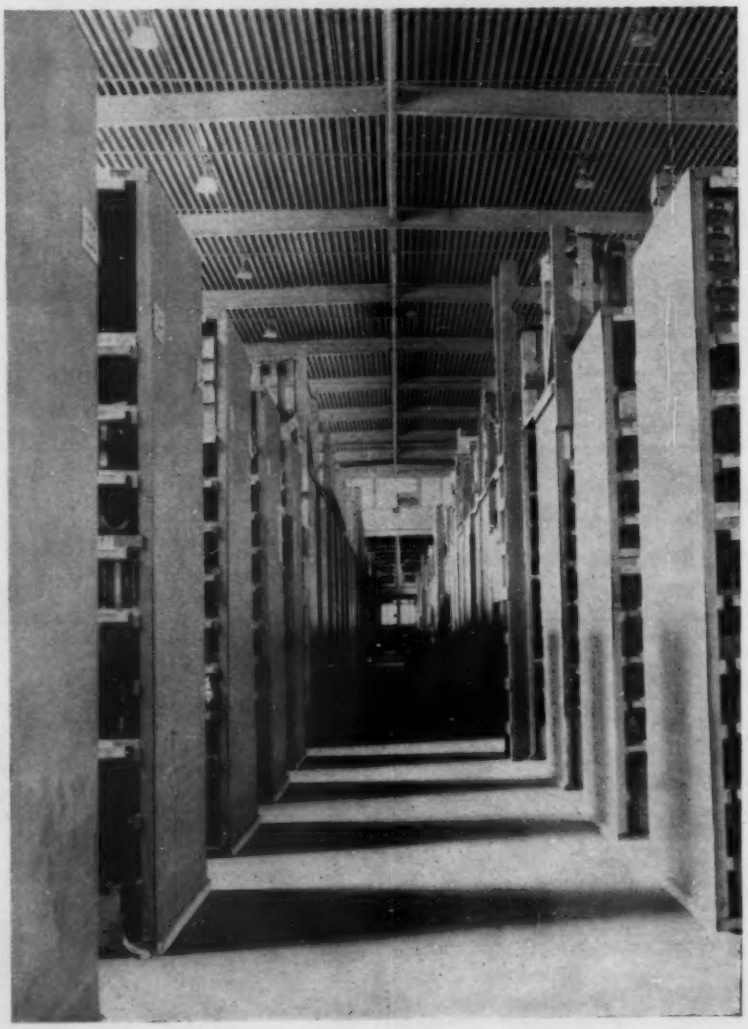
Economic obsolescence can also occur through failure, in inventorying, to reduce assemblies to their individual components.

Example: an assembly may be dollar obsolete, though not its component parts. Consider an assembly involving 20 parts. Use-history indicates that the assembly as a whole seldom requires full replacement. Rather, a few of its parts frequently fail. To stock the assembly as a whole is too costly, since only a few components cause replacement of the whole. Rather, the assembly should be broken down into parts—each part assigned an account number. That's why almost all assemblies at Kaiser are reduced to components. Kaiser stocks only the vulnerable parts—not the entire unit.

Further, dollar obsolescence may occur through improper ordering—either numerically or value-wise. This is by far the most complex segment of the Kaiser thesis. Simply stated, it maintains that for every part there is an economic and use-history formula that pinpoints—and determines—the exact amount and frequency of purchase.

The formula considers the part's use-history, contemplated engineering changes, necessary procurement time

This is part of Kaiser Steel's maintenance parts "bank." Just a portion of the $8,000,000 worth of stock to keep the plant in running condition



For every spare part there's a ledger account. This portion of the files gives some idea of immensity of Kaiser's stock of maintenance and replacement parts

to avoid a zero balance in the account, the cost of procurement (paperwork), the cost of carrying the part in stock, and the future—the possibility that a part purchased for $1.00 this year may be obtainable for 75 cents next. And lastly, the machine (its longevity and use) to which the part belongs.

When, last year, maintenance warehousing was asked to reduce its total inventory by $1,000,000, it did so—thanks to its dollar-obsolescence system—without risking a zero balance in any account.

More than that, the RMI form alone keeps field men (both engineers and maintainers) apprised of the dollar obsolescence concept. Right now, for example, some $100,000 worth of parts are pending—parts which maintenance has voluntarily decided to hold up ordering until satisfied they won't grow obsolete.

Predicted Obsolescence

Obsolescence is likewise predicted long before it becomes actuality at Kaiser. For Kaiser's dollar obsolescence concept gives special atttention to slow-moving items—to warehoused spares which, through their use-history, seem likely to become obsolete.

Slow-moving items are segregated —and discovered—by machine sorting. Every week, as the 70,000 account punch-cards are processed, slow-moving accounts are culled and segregated.

There are three classifications of slow-moving items. Initial pigeonholing of an item in Class I, the first slow-moving category, comes if the spare has not been issued for more than six months and if there have been no receivings (additions to the stock) for more than three years. An item remains in that class, falls into Class II if there's been no issue for six months, no receivings posted to the account in 4 to 5 years. Items are classified Class III if they've had no issue in six months nor receivings for more than five years.

As you can see, the first indication that an item is headed for obsolescence is lack of issuance—low activity.

Each slow-moving classification involves a percentage of "write-down" —devaluation from its former full value to a new, lower book-value.

While essentially a tax function, the write-down has a secondary purpose—it realistically apprises maintenance of a potential dollar loss. For the loss must be debited against the warehouse's total capitalization. Every write-down for obsolescence reduces total capitalization. The loss is reflected not only as a dollar loss to the company—but physically, as fewer parts for maintenance. Accounts are "written-down" through Classes I to III, until spares are carried at 9.9 per cent of their original cost.

Slow-moving items, regardless of class, get special attention. Object: to turn slow-movers into usable spares. "Request for Material Information" forms go out to engineering, singling out slow-moving spares for closer scrutiny. Maybe the spare can be modified or redesigned, fitted into an account where demand is heavy. New threading might make the part usable.

Some of the "select items" in Kaiser's big warehouse. These are items valued at more than $50.00 those most closely watched for signs of incipient obsolescence

If so, maintenance does the rework, returns the part to stock (with a new catalog number). As last resort, the account may be declared "surplus", turned over to a Kaiser section charged with disposing of obsolete material at the best current price. Whatever the action, maintenance warehousing tries hard to recoup at least part of its predicted loss—should the spare fall into Class III.

Then, too, besides "select items"—which have very high dollar value—

(Continued on page 170)

Here's How Chrysler Solved One Modernization Problem

Fig. 1. Left: Chrysler's new Body Paint Plant is part of a multi-million dollar modernization program that is increasing production capacity by 40 per cent. Fig. 2. Below: Early construction photo shows steelwork being erected over receiving docks, right, rail spur, left

Fast, Fireproof Construction Swallowed Old Buildings, Utilized Old Facilities During Building Period

By CARL SIMEK, Plant Engineer, Chrysler Division, Detroit, Mich.

EXPANSION and modernization frequently pose a problem for the plant engineer. In an industry like ours, where continuous production is of utmost importance, arriving at solutions can be pretty complex. Take the case of our own Chrysler Division Body plant in Detroit.

This plant is one of two Chrysler Division plants that are now being completely revamped and re-equipped as part of a multi-million dollar expansion program. It's expected that this program will boost Chrysler's production capacity by about 40 per cent.

As the first part of this program, we built a $20 million body painting plant adjacent to our Kercheval Body Assembly building. By concentrating all body painting operations in one location, the new plant will make a considerable contribution to increased economy and higher production. To assure maximum efficiency we've incorporated the newest and latest methods of body assembly and painting known to the industry.

This includes assembly of the hood, fenders, and deck lids to the body in our "body-in-white" shop operation (the stage at which the components are still unpainted) so that we can paint the entire assembly at once. Previously, it has been an industry-wide practice to paint the fenders, hoods, and bodies separately, assembling them later.

The change in assembly and painting procedures was partly the result of the wide variety of colors Chrysler offered in 1955. We found this improved procedure will help us out in at least three ways:

First, it provides a better product for our customers. The new painting and assembly operations absolutely eliminate every chance of off-colors between components formerly painted separately. What's more, we've found that painting auto exteriors as a unit assures longer life, and eliminates paint cracks and scratches caused by separate assembly.

Second, this consolidation greatly improves our internal efficiency. We'll be using only one shop for painting the entire body assembly, instead of separate shops for individual components. In addition, exterior finishes are protected from lint and dust by an air filtering system that completely replaces all the air in the plant every three to six minutes. The air supplied to the spraying booths is filtered three times to assure ideal painting conditions.

Third, we'll get additional economy and efficiency from the modern conveyors and equipment installed in the new plant. The conveying system, for example, will be as automatic as practicable. This even includes fully automatic transfers from one line to another. After the conveyor system

carries the body through more than 30 individual cleaning, painting, and baking operations, it sends the body to another part of the plant across the street for interior and chrome trim assembly. The body is conveyed by monorail conveyors across Jefferson Ave., through a bridge, to the Jefferson plant where the body hardware is added and the body assembly is mounted on the chassis for final assembly operations.

Completion of this new plant makes it possible for us to produce up to 1,200 cars a day—an increase of 40 per cent. In planning the modernization and reorganization of facilities that made this improved production picture possible, we had to construct a new building to house the body paint shop. The logical location for such a building was a relatively vacant spot between two older buildings, one of which contained our body-in-white operation. Standing in the path of the proposed new construction, however, were an ash silo, a water tower, some truck docks, railroad tracks, a conveyor system, and two smaller buildings that housed paint mixing and storage operations.

Complicating the picture was a deadline we had to meet. The building had to be constructed and the paint shop had to be in operation by model changeover time. In addition, the area containing the paint spraying and drying operations had to be fireproofed.

Our problem then, was to find the fastest and most practical method of constructing the new building, and fireproofing the entire body paint shop without disrupting current production. And we had to have it done on time.

By working together with our architect, Albert Kahn and Associates, and our general contractor, J. A. Utley Company, we were able to work out a plan for constructing the building without disrupting production.

Fig. 3. Carrying parts to the assembly line, an overhead conveyor moves them past newly plastered and fireproofed ceilings and beams in new body paint plant

The proposed building was a two-story steel and concrete structure, measuring 1090 ft long by 284 ft wide. The second floor houses the complete painting operation. On the first floor are paint mixing and storage areas, barrel storage, receiving operations, sheet metal operations, offices, and complete medical facilities for the plant.

Since the body paint shop is classified as a hazardous area, we took many safety precautions in its construction, including the use of fire-protective materials to separate it from the adjoining areas of the plant.

The second floor construction, for example, is of 4 in. reinforced concrete poured over a special joist type metal decking. Under this decking, we suspended a continuous membrane of metal lath and coated it with a 1-in. layer of a special fireproofing plaster. In this way, trusses and beams supporting the paint shop received a 4-hr

This Was Method Employed To Fireproof New Chrysler Paint Plant

This photo shows workmen "tying up" metal lath preparatory to the application of vermiculite plaster

This picture shows the vermiculite plaster being applied by machine method to suspended metal lath membrane

Fig. 4. Using modern machine methods this workman encases a structural beam in fire-resisting vermiculite concrete. This material keeps the beam from buckling in case of fire. Also shown is the metal sub-floor under which was subsequently hung metal lath membrane, used as base for the vermiculite plaster application

fire protective rating. The plaster obtains its fire-protective characteristics by replacing the sand with vermiculite, an insulating mineral mined and processed by the Zonolite Company, Chicago.

All booths, ovens, and other enclosed operating equipment have a separate air supply and exhaust system, located in three equipment rooms constructed across the building roof. All transformers are located in the fan housing room also on the roof.

Our plan was to start construction at one end of the site and proceed to the other, using the old facilities as long as possible, and removing each obstacle as we came to it. Obstacles included the previously-mentioned water tower, ash silo, railroad tracks and conveyors. Premature removal of any of these would have made automobile production impossible.

Take the railroad tracks, for example. One set of these stretched along the entire 1,000 ft length of the new building, about 50 ft inside the proposed west wall. Since these tracks were essential to our receiving operations, they had to be kept in use while the building was constructed overhead.

Material receiving operations were scheduled so they would provide a minimum of interference with construction workers — and vice versa. Cooperation between construction and production personnel made this phase of the plan quite workable. The railroad tracks were used until construction had progressed far enough to permit use of four new sets of tracks which extend 425 ft in from the north end of the new building. These tracks were put into service almost as soon as they were laid. They brought in critical supplies for production, as well as construction materials.

We ran into just about the same kind of a situation on conveyor systems stretching across the site of the new building. One of these carried bodies from the body-in-white shop to the old body paint shop, at an average height of 28 ft above ground. The new building was built right around the conveyors, without disrupting their operation.

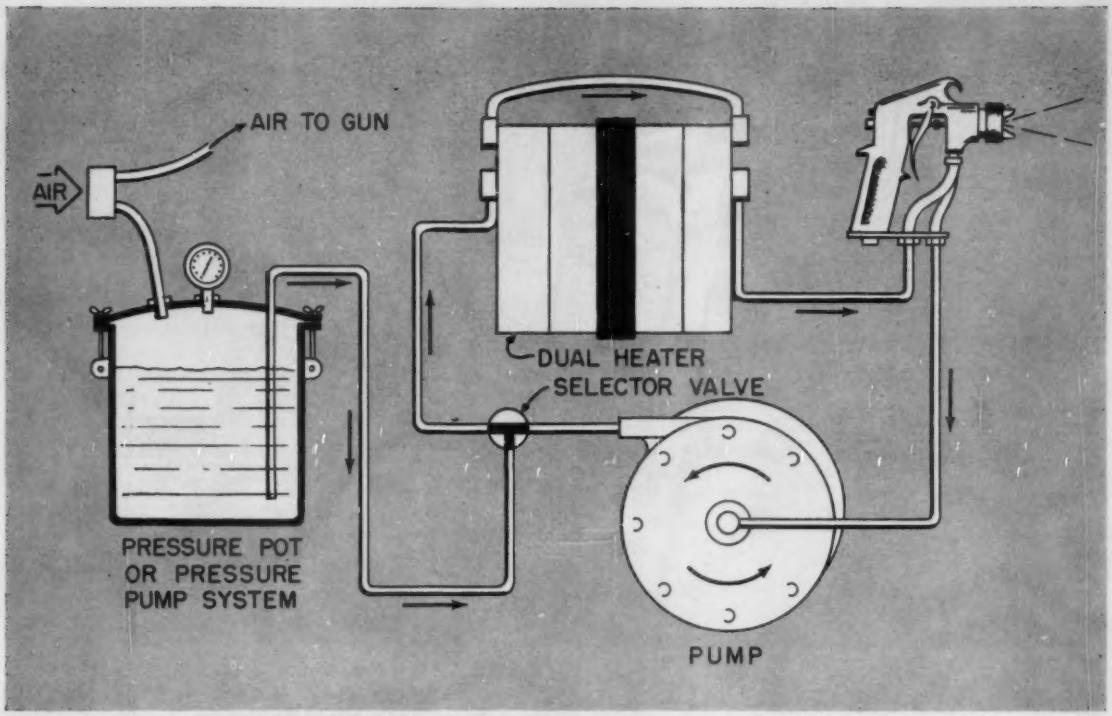
We met the problem of the water tower, ash silo and other buildings in much the same way. We built around the ash silo; left it standing until a new one could be constructed elsewhere, and the operation transferred to the new silo. Then, the old water tower was dismantled ahead of construction of the new one.

In much the same way, we built around several other buildings occupying the site, used for paint mixing and miscellaneous material receiving and storage operations. Through coordination of construction and production operations, both were able to proceed at all times, even while the new building was going up right over the old ones.

When confronted with the task of building and fireproofing the second floor body paint shop, however, the problem became more acute. Our production needs demanded a large part of the first floor space for storage, receiving, and other production operations. It would be impossible to fireproof the area above in the conventional manner, since the concrete

(Continued on page 170)

Fig. 5. By confining heat and flames to a limited area, this fire curtain helps protect the plant. Right hand portion of the curtain is still just a skeleton of steel. Left hand portion has been covered with metal lath and special plaster



Flow diagram of heat-pressure spray painting system. Dual heater is composed of two standard heaters "back-to-back"

Corrosion Control's New Tool—

Hot Spray Painting Equipment

VINYL BASE paints, considered highly effective against corrosion present many and varied spraying difficulties, one being that numerous coats are required to build the desired mil thickness, thus creating a high labor cost per square foot.

A major chemical company in the Gulf Coast area, the Union Carbide and Chemical Company, combined the corrosion resisting properties of vinyl coatings with the material and labor saving features of a hot spraying application process, and proved that by applying vinyls hot, it is possible to obtain an average of two to five mils per coat, compared with ¾ to one mil per coat, spraying with conventional cold spray.

Severe exposures in both salt water and sunlight have proven that the hot spray is doubling the life of the protective coating.

Tests on vinyl materials showed that as with most paint materials, the viscosity is sharply lowered as its temperature is raised. However, it was found that there is less than four per cent variation between 150 F and 165 F. Therefore, if a material is sprayed in this temperature range, the spraying viscosity is constant, regardless of the weather temperature. Also, with hot spray application, the atomizing pressure, the fluid pressure and the gun adjustments can remain constant throughout the day and the season.

Heating paint to this temperature causes the immediate evaporation of much of the solvent, depressing the temperature of the paint so that it is at, or slightly above, the ambient temperature when it strikes the surface being painted. This solvent release also increases the viscosity of the paint, resulting in a much greater film thickness without sags. Lowered atomizing pressure, made possible by the reduced spraying viscosity, cuts wasteful overspray, saving many dollars in material costs.

To offset problems formerly experienced with hot paint applicators—often subject to clogging and restriction of flow and heat transfer—a simple and efficient coilless design has been developed for mobile maintenance and production applications, by the Spee-Flo Company.

The heater, shown above in a dual mounting, may be rigidly mounted for spray booth installation, or may be carried over the painter's shoulder in an insulated case, for easy portability. Dolly mounted, it can be used for large area work, such as structurals or storage tanks in large plants.

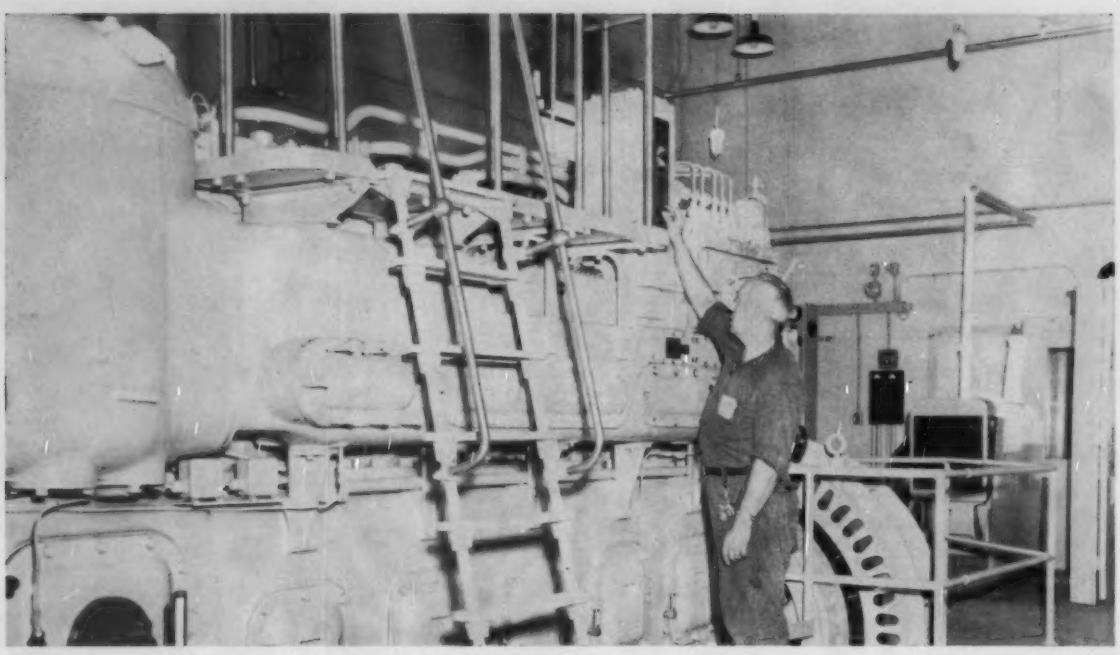
Coupled with an integral air or electrically driven centrifugal pump, the heater will circulate the vinyl or other paint to the gun and return, to maintain a constant spray temperature for continuous service.

The pump has no close fitting tolerances to wear, and it is therefore, particularly well designed for the circulation of paint.

Standard units will spray 7½ gal per hour, and the heavy duty series, utilizing dual heating units, will spray up to 20 gal per hour. Figure 2 shows a typical schematic flow diagram for spraying paint, using a pressure tank and pump to maintain pressure and temperature.

Want More Facts?

For complete information on this hot spray tool, write to the Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill., or write "Spee-Flo" on one of the postage paid cards in this issue.



Q and A Study of Diesel Engines

Answers Questions on Timing, Power Output, Injection Lag

By R. R. TAGGS, Electrical Engineer

QUESTION ONE—If our four-cycle engine's camshaft is removed and the timing completely lost, how would we time the engine in a hurry?

A—A four-cycle engine's intake valve opens from 10 to 20 degrees before piston reaches top dead center (TDC), and exhaust valve closes from 10 to 20 degrees past top dead center.

However, for quick timing, jack the piston of any cylinder to top dead center, with the camshaft gear out of mesh. Then turn camshaft until the inlet valve just starts to open and the exhaust valve just starts to close. Mesh gears while camshaft is in this position. Timing will then be correct to one gear tooth.

Q2—If one cylinder of a diesel engine receives more fuel than the others, how is engine's operation affected and how would we prevent more fuel in a cylinder than in another, for instance?

A—The cylinder receiving more fuel is affected in a number of ways, depending on conditions.

Excess fuel in one cylinder causes incomplete combustion in that cylinder because too much oil is injected for the air supplied. Then too, incomplete combustion creates a smoky exhaust. If excess fuel isn't stopped soon, carbon accumulates around the piston rings, sticking them in grooves. If rings stick, piston won't compress enough air at a proper pressure (because of leakage past rings), with a subsequent decrease in compression temperature and loss of combustion. The result: more smoke. Again, sticky rings will allow combustion gas to blow past piston removing the lube oil off cylinder and piston walls, scoring them and even causing pistons to seize.

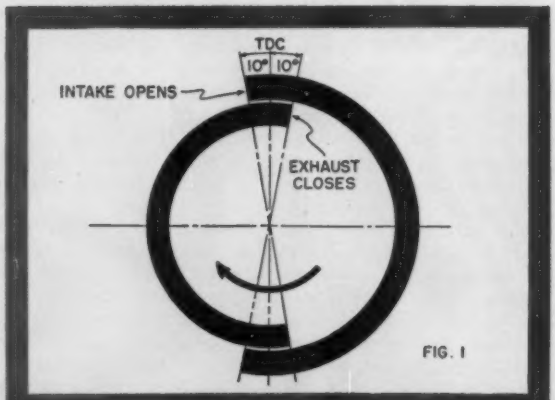


FIG. 1

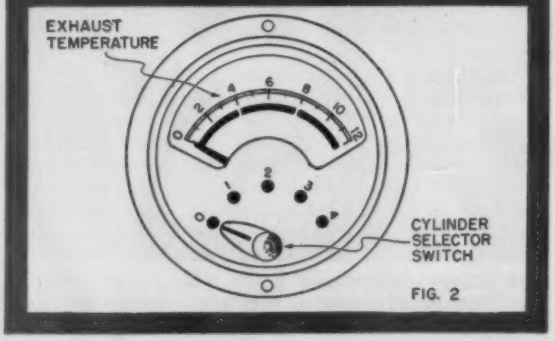


FIG. 2

Excess fuel also causes combustion knock. Because of power loss in one cylinder, fuel is wasted. With remaining cylinders doing more than their share, engine starts overheating. Best way to avoid excess fuel is to check cylinder exhaust temperatures with a pyrometer every hour. Then adjust fuel oil and air so all cylinder exhaust temperatures are within 10 F.

Q3—What are the average compression pressures and temperatures in a full diesel engine?

A—Air is compressed from 400 to 500 psi in the cylinder. At these pressures, it ranges from 800 to 1000 F. These temperatures are high enough to ignite fuel entering cylinder for combustion.

Q4—How is a diesel engine's power output increased without increasing the engine's revolutions or size?

A—The most popular method is by supercharging. This means delivering air above atmospheric pressure to the cylinder. The same engine burns more fuel and increases mean effective pressure, without increasing cylinder size, or boosting the rpm.

With supercharging, instead of engine *drawing in* atmospheric air, the air is *forced into* cylinders by blowers (or air pumps) up to about 10 psi above atmospheric pressure. Engine's output is increased about 40 per cent.

Q5—What is meant by injection lag and how is it caused?

A—Fuel is injected into the cylinder about 10 degrees before piston reaches top dead center (TDC). But the fuel-pump cam is timed to force oil through the pump about 30 degrees before top dead center. This difference of 20 degrees is the injection lag.

Injection lag is caused by: 1—Expansion of fuel-oil discharge lines under high pressure, resulting in need for additional fuel volume to be displaced; 2—Compressibility of fuel. When fuel is near 3000 psi, it is compressed about 1 per cent of its volume; 3—Leakage past the fuel-oil plunger.

So fuel-oil lag is actually a kind of lost motion and is compensated for by pumping oil into the fuel-distributing system earlier than needed by the cylinders.

Q6—What are some causes of a smoky exhaust?

A—A smoky exhaust is caused by one or more faults. Perhaps the most common is from unequal fuel distribution to the cylinders. Or the engine's load may be excessive. If the cylinder or exhaust valve receives too much lube oil, engine will smoke because of burning lube oil. And also if fuel injection is late. Water in fuel or fuel not suitable for engine will create smoky exhaust. Fuel injectors improperly adjusted are a prime cause. Weak or broken fuel-valve spring is another. Obstructed exhaust piping and low compression in cylinders are also common causes.

Q7—Why must fuel injectors be kept in perfect working condition?

A—A faulty injector is like a boiler's faulty oil-burner tip. Unless the oil sprayed into the cylinder is very finely atomized, the oil cloud does not burn properly and some of the fuel is wasted in smoke. Some diesels do utilize a coarse spray and still burn oil efficiently. But they depend on pre-combustion or turbulence chambers to mix the oil with air before entering the cylinder.

The cloud of tiny oil droplets sprayed directly into the cylinder ignites when heated to the critical temperature due to compression. The smaller drops, of course, heat sooner and burn earlier. And because the larger particles heat more slowly, they ignite later and require additional time to burn. If the particles are too large, they are exhausted before they burn completely. This is a fuel waste and increases consumption.

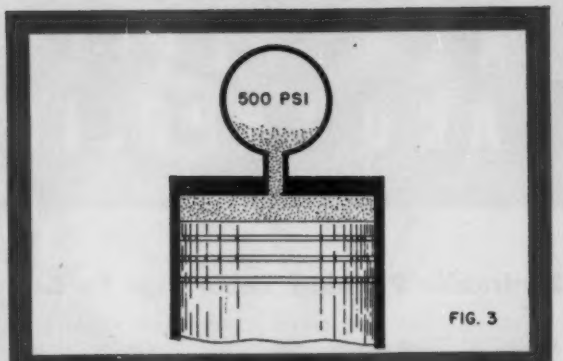


FIG. 3

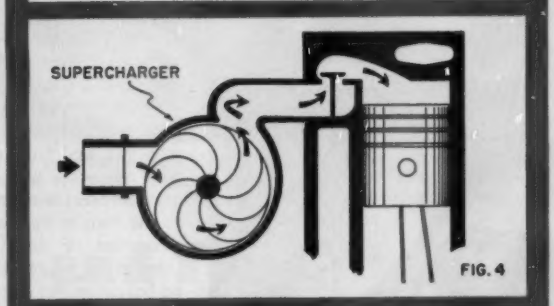


FIG. 4

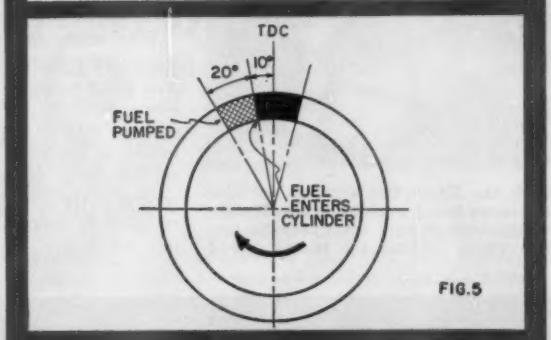


FIG. 5

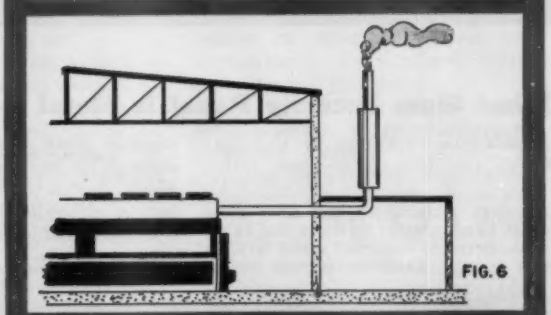


FIG. 6

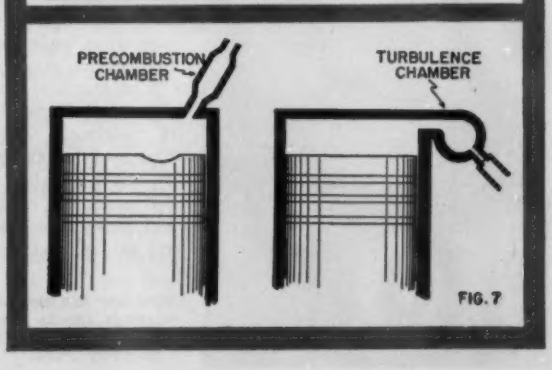


FIG. 7

NEW DEVELOPMENTS AND APPLICATIONS

Hydraulic Packing Table Tips To Let the Heavy Loads Down Easy

HYDRAULICALLY CONTROLLED, the Hydra-Tilt Table can be tilted to set boxes weighing up to 1000 lb on the floor after they have been packed. This new packing bench incorporates a hydraulic cylinder which lets the operator tip the load from table to floor by means of a control lever.

With the Hydra-Tilt a single operator can move heavy crates quickly. Weight of the load powers the hydraulic system which controls the tilting speed

Heavy pieces of equipment can be placed on the table by the use of a monorail and hoist arrangement, company suggests, and can then be boxed at convenient working height and tilted to the floor to be trucked away. Large quantities of small objects to be shipped in large containers can also be boxed on the Hydra-Tilt Table and then moved to the floor.

Both safety and time-saving advantages are announced for the Hydra-Tilt, since a single operator can move heavy loads to the floor quickly and without risk of injury. The table is locked in horizontal position until the control lever is released. Then the weight of the load provides the inertia required to operate the hydraulic system which controls the speed of tilting. Besides machinery handling, the table is suggested for packing automotive and machine parts, electrical appliances and canned goods.

The Hydra-Tilt is manufactured by Valley Craft Products, Inc., a division of O'Neil Irwin Mfg. Co. It was originated by the parent company to meet requirements of its own shipping department where it has been in use for several years.

The table is 24 by 72 in. and has several built-in drawers for holding packing materials and tools. A 3-in. height adjustment can be made to suit the user's convenience. The cylinder operating the tilting mechanism needs no source of power other than the load being handled, as a closed hydraulic system controls the tilt of the table through a by-pass operated by a valve.

For further details on this table, just write "Hydra-Tilt" on the handy Reader Service Card on page 181. Or drop a line to PLANT ENGINEERING, 110 S. Dearborn St., Chicago 3, Ill.

Fiber Glass Security Panel Is Metal Reinforced for Strength and Rigidity

RECENTLY DEVELOPED by Resolite Corp., this fiber glass panel makes possible many new applications because of its increased strength and rigidity. In it, a sheet of expanded metal lath is embedded in a layer of 3-oz fiber glass mat impregnated with polyester resin.

Although translucent, this fiber glass panel offers greater strength due to reinforcement of expanded metal lath. It is 8 ft high, available in four widths

The product is suggested for glazing security windows, small unsupported skylights; for enclosures for dangerous equipment; for screening for security, privacy and dust-proofing.

The standard sheet is produced in the colorless, semi-clear resin which is translucent but not transparent. Standard length is 8 ft, and 1-, 2-, 3-, and 4-ft widths are available. Special sizes and colors can be supplied and the sheet also comes in fire-retardant or "self-extinguishing" resin.

You may use the Reader Service Cards on page 181 to receive more information on this product. Just write, "Security Panel" at bottom of card.

Security panels around a high pressure hydraulic pump confine flying particles, oil spray in case of equipment rupture. Gage is read through lucite "window" provided in one of the resin panels

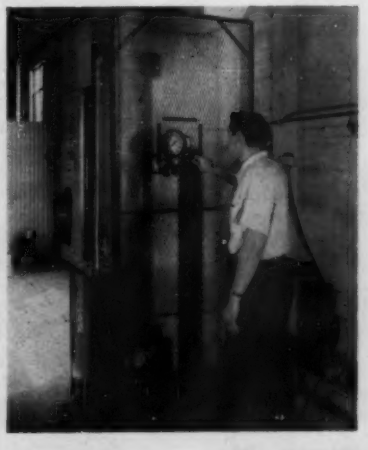


Fig. 1. Navy men in conference with Plant Engineering editors in preparation of article on Navy's Controlled Maintenance Program. Left to right: Cdr. T. P. Cocke; R. H. Morris; Capt. A. C. Husband; Capt. E. J. Peltier; Thomas E. Hanson; I. W. Rhodes, Jr., E. B. Skubik; Cdr. H. N. Wallin; C. R. Earle; and H. K. Lowry. Meeting was held in offices of Budocks

Control Maintenance and You Cut Costs

Pilot System at Norfolk Proves New Navy System Really Works

By **THOMAS E. HANSON**, Editor, Plant Engineering; with introduction by
RADM R. H. MEADE (CEC) USN, Chief of the Bureau of Yards and Docks

FOR MANY YEARS maintenance of the Navy's Shore Establishment was performed at its many activities without too much coordination, consequently it varied with activities.

However, in recent years, we, in the Navy, have been convinced that the money being spent to maintain the Shore Establishment could have been spent so as to provide more effective maintenance than we were getting. It had to be applied on the right things, in the right place at the right time. Complicating our problem were the many facilities that were constructed of inferior materials on a hurry-up basis. Many of these facilities have reached the end of their economical life, yet must be maintained until permanent ones are provided.

We had to determine whether we were to maintain our active facilities for an indefinite period of use, or for a limited period of use. Inactive facilities included in mobilization plans had to be protected to certain degrees to permit their reactivation in a prescribed period. Hence, before we could formulate any program of Controlled Maintenance that could be evaluated for adequacy, we had to establish maintenance standards commensurate with the projected useful life of the facility or program to which it was related. Thus, we had to refine our maintenance procedures.

Consequently, the Navy has developed, tested and is now sponsoring, the installation of a Controlled Maintenance Program which is being applied to shore activity Public Works Departments, Navy-wide. This program has three basic objectives:

(1) To bring the facilities of the Naval Shore Establishment up to a proper level of maintenance.

(2) To increase the productivity of the maintenance forces, and

(3) To achieve actual savings in maintenance and utilities services.

The program can be considered as consisting of two parts. First, the Basic Elements, which include Organization, Continuous Inspection, Planning and Estimating, Shop Scheduling and Methods Analysis; and, Management Reports.

At the activity, or station, level, it is the Public Works Department that this program is designed to assist.

Since the Naval Shore Establishment is made up of such a large variety of activities including airfields, shipyards, supply depots, research laboratories, ordnance depots, hospitals, and training centers, it was essential to insure that the Program, as formulated, was readily adaptable Navy-wide. Consequently, arrangements were made through the Navy's various Management Bureaus and Offices to install the Program at "pilot installations" at representative activities. First of these, the subject of the following article, is the Public Works Center, Norfolk Naval Base, under management of Bureau of Yards and Docks.

The benefits derived can be summarized as follows: (1) Proper maintenance of facilities; (2) Increased production by the maintenance forces; (3) Positive control of work input; (4) Accurate work backlog information; (5) Accurate and timely information on maintenance costs and performance; (6) Uniform control and reporting procedures.

The Assistant Secretary of Defense for Properties & Installations, the Honorable Franklin G. Floete, has supported this program, as being consistent with the Dept. of Defense policies for the management of maintenance of real property throughout the military establishment.

Implementation of these programs throughout the Navy was directed by the Honorable Raymond H. Fogler, the Assistant Secretary of the Navy for Material.

The Bureau of Yards and Docks, as the Secretary of the Navy's agency responsible for technical control of maintenance and operation of public works and public utilities, has coordinated the development of these programs with the Navy Comptroller, and the Navy's management Bureaus and Offices. (Signed)

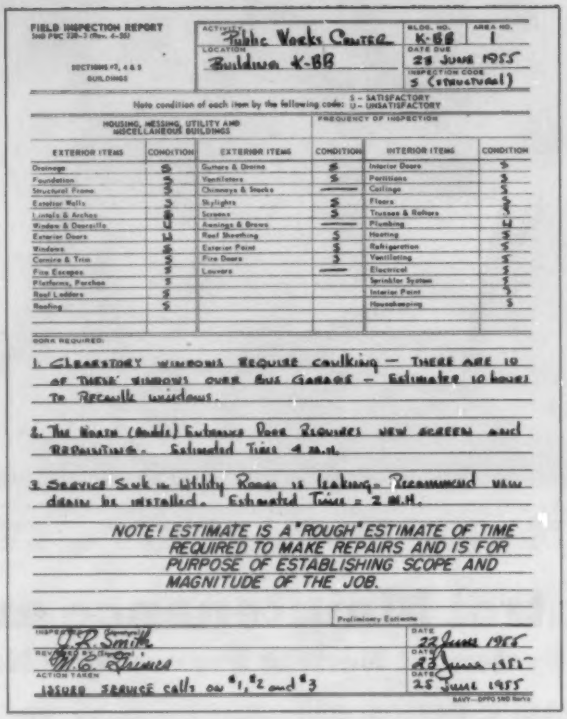
**R. H. Meade, RADM,
CEC, Chief, Bureau
of Yards & Docks**

IN ORDER TO determine the effectiveness of this program described by Adm. Meade and to be able to report to PLANT ENGINEERING's readers on the actual workings of the program, our editors recently were given a green light by the Department of Defense on the preparation of an exclusive article covering the program. First, we received a full day's briefing at Bureau of Yards and Docks in Washington, D. C., under the guidance of Captain E. J. Peltier, CEC, USN, Assistant Bureau Chief for Maintenance and Materiel, and his staff. This briefing covered the over-all planning of the program and brought us up to date on its status at the various activities.

We next set out for the U. S. Naval Base at Norfolk, Virginia, to study at first hand the pilot installation; our host was Captain R. Lamoreaux, CEC, USN, Officer in Charge, Public Works Center. It was here that we discovered the program is really paying off.

It should be made clear at this point that the problem facing the public works officer at a Navy base is slightly different from the one encountered by the industrial plant engineer. For one thing, there is no production equipment to be installed or maintained. The big problem is that of building and grounds maintenance; the second greatest problem is the maintenance of transportation equipment, followed closely by that of utilities maintenance.

Prior to the introduction of the Controlled Maintenance Program, one factor contributing heavily to nonproductive time was the high percentage of emergency or "breakdown repair" work. This not only obviated close control of maintenance labor time but also permitted indiscriminate scheduling of work beyond the immediate ability of one craft or "work center" to handle the jobs.



FIELD INSPECTION REPORT

ACTIVITY: Public Works Center — BLDG. NO.: K-88 — AREA NO.: 1

LOCATION: Building K-88 — DATE DUE: 28 JUNE 1955

SECTIONS #2, 4 & 5 BUILDINGS — INSPECTION CODE: S (Structural)

Note condition of each item by the following code: S – SATISFACTORY; U – UNSATISFACTORY

HOUSING, MESSING, UTILITY AND MISCELLANEOUS BUILDINGS — FREQUENCY OF INSPECTION

EXTERIOR ITEMS	CONDITION	EXTERIOR ITEMS	CONDITION	INTERIOR ITEMS	CONDITION
Drainage	S	Gutters & Drains	S	Interior Doors	S
Foundation	S	Ventilators	S	Partitions	S
Structural Frame	S	Chimneys & Stacks	—	Ceilings	S
Exterior Walls	S	Skylights	S	Floors	S
Lintels & Arches	S	Screens	S	Trusses & Rafters	S
Window & Doorsills	U	Awnings & Drapes	—	Plumbing	U
Exterior Doors	U	Roof Sheathing	S	Heating	S
Windows	S	Exterior Paint	S	Refrigeration	S
Cornice & Trim	S	Fire Doors	S	Ventilating	S
Fire Escapes	S	Louvers	—	Electrical	S
Platforms, Porches	S			Sprinkler System	S
Roof Ladders	S			Interior Paint	S
Roofing	S			Housekeeping	S

WORK REQUIRED:

1. CLERESTORY WINDOWS REQUIRE CAULKING – THERE ARE 10 OF THESE WINDOWS OVER BUS GARAGE – ESTIMATED 10 HOURS TO RECAULK WINDOWS.

2. THE NORTH (MIDDLE) ENTRANCE DOOR REQUIRES NEW SCREEN AND REPAINTING. ESTIMATED TIME 4 M.H.

3. SERVICE SINK IN UTILITY ROOM IS LEAKING. RECOMMEND NEW DRAIN BE INSTALLED. ESTIMATED TIME = 2 M.H.

NOTE! ESTIMATE IS A "ROUGH" ESTIMATE OF TIME REQUIRED TO MAKE REPAIRS AND IS FOR PURPOSE OF ESTABLISHING SCOPE AND MAGNITUDE OF THE JOB.

Preliminary Estimate

INSPECTED BY: F. P. Smith — DATE: 22 June 1955

REVIEWED BY: M. C. Grimes — DATE: 23 June 1955

ACTION TAKEN: ISSUED SERVICE calls on #1, #2 and #3 — DATE: 25 JUNE 1955

NAVY—DPPO 5NO 5NYd

Fig. 3. In filling out field inspection reports the inspector lists not only the discrepancies and deficiencies but also recommends corrective action to be taken

Some idea of the magnitude of costs and properties of the over-all Naval activities may be gained from the following facts:

1. Cost of maintenance and operation of the shore facilities in the Navy last year amounted to around $600,000,000.

2. This amount was spent on some 800 different activities or installations, approximately 300 of which are classified as major stations.

3. Today, the book value of these shore facilities is over $7,000,000,000. Cost of replacement at today's prices is about $13,000,000,000.

It is evident that, with property values running into such astronomical figures, there was bound to be a great deal of water in the maintenance costs. In the past, maintenance at the various stations had been accomplished without too much guidance from top levels of management. The degree of maintenance varied between activities, and its quality depended to a great extent upon the capability and ingenuity of the local public works officer and his top supervisors.

Obviously, there was a need for standardization; properties at some activities were being over-maintained while others were under-maintained. In addition, there was a great need for some instrumentality by which lessons learned at one activity could be passed along to all activities.

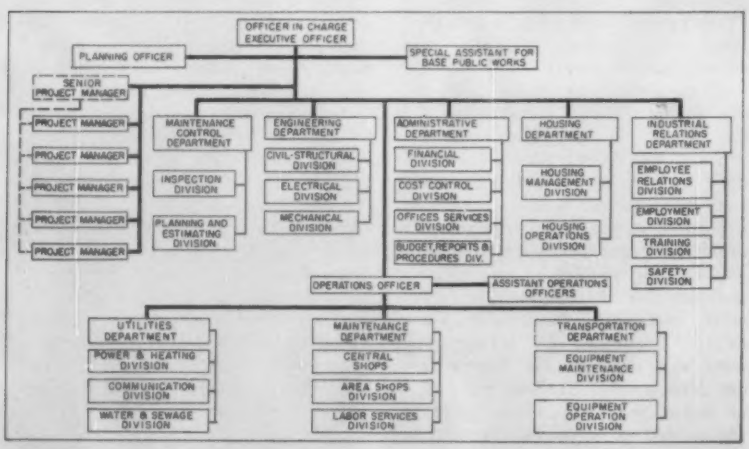


Fig. 2. Organization chart for the Public Works Center, Naval Base, Norfolk, Va.

Organization

First basic element of a controlled maintenance program, either industrial or governmental, is the proper organization. The organization approved by the Bureau of Yards & Docks for the Public Works Center is shown in Fig. 2. The major change here has been the addition of the Maintenance Control Department which is the staff element responsi-

ble to the Public Works Officer for controlling the maintenance function.

Primary functions of this department are: 1. To integrate the maintenance workload; 2. To coordinate a continuous inspection program; 3. To provide standard times, or estimates for job orders; i. e.: any work authorization to the shop except trouble calls; 4. To recommend to the Public Works Officer when work should be accomplished by contract; 5. To prepare job orders and other work authorizations for work to be done by the maintenance and utilities shops; 6. To evalute work performance; 7. To make methods analyses; 8. To recommend action required to increase productivity; 9. To analyze man power and material used.

Continuous Inspection

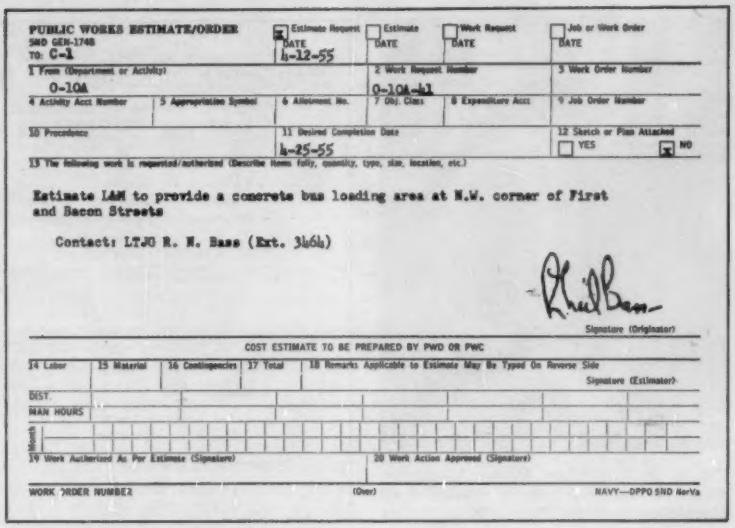
Second basic element in this Controlled Maintenance Program is Continuous Inspection. The continuous inspection program starts with an inventory of all items that require inspection, followed by an analysis of each item to determine the proper frequency at which it should be inspected. In this way, equipment with moving parts is inspected more frequently than are buildings. It is, essentially, a major preventive maintenance program.

Inspections, in turn, are split into three categories. First, the operator inspections which are made by personnel assigned to operate specific mechanical facilities such as boilers, generators, bridge cranes. These inspections are made in connection with their operating duties.

Second category includes the preventive maintenance inspections. These are accomplished by shop personnel and are usually made on dynamic equipment for which the specific shop is responsible.

Third category is the control inspection which, in turn, fall into two sub-groups: First, those inspections of items not included in the first two categories such as buildings and their components. A sample inspection form is shown in Fig. 3. Second, a check inspection, probably once a year, on those items covered by the preventive maintenance inspections, in order to insure that they are adequate.

Inspections in the first two categories are carried out by the Shop Divisions, while the control inspections are accomplished by the Inspection Division of the Maintenance Control Department. The Department has the overall responsibility for an adequate inspection program and, in addition, assists the shops in setting up their preventive maintenance inspection program. It also establishes proper frequencies for inspections. The Navy



PUBLIC WORKS ESTIMATE/ORDER
SND GEN-174B
TO: C-1

[X] Estimate Request DATE 4-12-55 [ ] Estimate DATE [ ] Work Request DATE [ ] Job or Work Order DATE

1 From (Department or Activity): 0-10A
2 Work Request Number: 0-10A-41
3 Work Order Number
4 Activity Acct Number | 5 Appropriation Symbol | 6 Allotment No. | 7 Obj. Class | 8 Expenditure Acct | 9 Job Order Number
10 Precedence | 11 Desired Completion Date: 4-25-55 | 12 Sketch or Plan Attached [ ] YES [X] NO

13 The following work is requested/authorized (Describe items fully, quantity, type, size, location, etc.)

Estimate LAN to provide a concrete bus loading area at N.W. corner of First and Bacon Streets

Contact: LTJG R. N. Bass (Ext. 3464)

Signature (Originator)

COST ESTIMATE TO BE PREPARED BY PWD OR PWC

14 Labor | 15 Material | 16 Contingencies | 17 Total | 18 Remarks Applicable to Estimate May Be Typed On Reverse Side
Signature (Estimator)

DIST.
MAN HOURS
Month

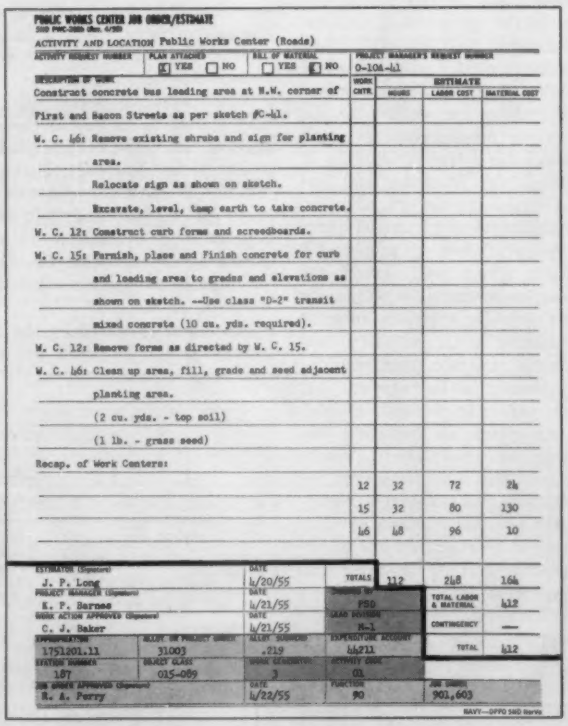
19 Work Authorized As Per Estimate (Signature) | 20 Work Action Approved (Signature)

WORK ORDER NUMBER (Over) NAVY—DPPO SND NorVa

Fig. 4. This form is used by Public Works Center Project Managers and/or Customer Activities to request work action or estimates on repairs or construction

hopes that, eventually, by means of these inspections, "breakdown" or emergency orders will be reduced to the proper minimum and thus a greater percentage of the workload will be planned and controlled.

Third basic element in the Controlled Maintenance Program is "Planning and Estimating." Planning, in turn, may be broken down into "job planning" and "shop planning." Job planning is accomplished by the



PUBLIC WORKS CENTER JOB ORDER/ESTIMATE
SND PWC-200A (Rev. 4/55)

ACTIVITY AND LOCATION Public Works Center (Roads)

ACTIVITY REQUEST NUMBER | PLAN ATTACHED [X] YES [ ] NO | BILL OF MATERIAL [ ] YES [X] NO | PROJECT MANAGER'S REQUEST NUMBER 0-10A-41

DESCRIPTION OF WORK

	WORK CNTR.	ESTIMATE HOURS	ESTIMATE LABOR COST	ESTIMATE MATERIAL COST
Construct concrete bus loading area at N.W. corner of				
First and Bacon Streets as per sketch #C-41.				
W. C. 46: Remove existing shrubs and sign for planting				
area.				
Relocate sign as shown on sketch.				
Excavate, level, temp earth to take concrete.				
W. C. 12: Construct curb forms and screedboards.				
W. C. 15: Furnish, place and Finish concrete for curb				
and loading area to grades and elevations as				
shown on sketch. --Use class "D-2" transit				
mixed concrete (10 cu. yds. required).				
W. C. 12: Remove forms as directed by W. C. 15.				
W. C. 46: Clean up area, fill, grade and seed adjacent				
planting area.				
(2 cu. yds. - top soil)				
(1 lb. - grass seed)				
Recap. of Work Centers:				
	12	32	72	24
	15	32	80	130
	46	48	96	10
		112	248	164

ESTIMATOR (Signature): J. P. Long — DATE 4/20/55 — TOTALS
PROJECT MANAGER (Signature): K. P. Barnes — DATE 4/21/55 — DRAWING NO. FSO — TOTAL LABOR & MATERIAL 412
WORK ACTION APPROVED (Signature): C. J. Baker — DATE 4/21/55 — LOAD DIVISION M-1 — CONTINGENCY —
APPROPRIATION 1751201.11 — ACCT. OR PROJECT NUMBER 31003 — ALLOT. NUMBER .219 — EXPENDITURE ACCOUNT 44211 — TOTAL 412
STATION NUMBER 187 — OBJECT CLASS 015-089 — WORK CLASSIFICATION 3 — ACTIVITY CODE 03
JOB ORDER APPROVED (Signature): R. A. Perry — DATE 4/22/55 — FUNCTION 90 — JOB ORDER 901,603

NAVY—DPPO SND NorVa

Fig. 5. Public Works Center Job Order/Estimate Form: All data above heavy black line is to be provided by the Estimator. Data in heavily shaded area is then filled in by the Manager of Planning and estimating division who then routes the estimate to the project manager. From here it goes to the Director of Maintenance Control Department. If approved, the estimate goes to Financial Branch which furnishes job order number, and other data in the lightly shaded areas. It is then typed and duplicated for distribution to the interested shops

Fig. 6. G. J. Butcher, Master Mechanic, Public Works, Norfolk, in charge of all maintenance shops, Public Wks. Center

Here are some statistics that show the magnitude of operations of the Public Works Center at the U. S. Naval base, Norfolk, Va.

It maintains:

22,000 linear feet of berthing space at waterfront
2.5 million square feet of pier deck area
46 miles of streets and roads
15 miles of sidewalks
43 miles of railroad track
80 miles of fresh and salt water distribution lines
27 miles of sanitary sewers
25 miles of storm sewers
72 miles of electric power distribution lines
34 miles of overhead and underground steam lines
9 miles of gas distribution lines
19 miles of fire alarm system lines
1825 buildings comprising 2.3 billion square feet
1477 sets of public quarters (including Benmoreell Housing)

It operates:

2,000 automotive vehicles
7 Diesel locomotives

It generates and distributes:

78 million kwh of electric power annually (in addition 36 million kwh is purchased annually from Virginia Electric Power Company)
36 hundred million pounds of steam annually

It purchases and distributes:

2½ billion gallons of water annually

planners and estimators of the Maintenance Control Department. Shop planning is, of course, done at the shop level, usually by the shop supervisor and the shop planner.

Job planning at Norfolk starts at the point where the customer* contacts the Public Works Officer or a Project Manager about a specific job. This job planning follows through to completion of the work and an analysis of the manpower and material used. Job planning includes such elements as the establishment of definite procedures for getting the work into the system, review and approval of work requests, and the actual processing of work through the Planning and Estimating Division to the shops.

An important element in job planning is the provision of proper job specifications which will permit the shops to order material, schedule the work, and actually dispatch men to the job without prior visits to the site by several separate supervisors.

Shop planning is the second part of the job planning procedure. This covers such items as initiating the procurement of material to insure that it is on the job site when required; having the required equipment on the job site; arranging with the customer to be ready for the workmen when they arrive; handling special requirements for a job, such as getting a barricade to a ditch job; and numerous other miscellaneous items.

Still another important part of planning, as carried on in this program, is maintaining a "work backlog." This information shows the work capacity of each shop related to the workload being imposed on that shop. This data permits intelligent scheduling, equitable distribution of shop forces, and also provides a red flag that tells the management when it is becoming advisable either to contract work or to reduce the shop forces.

Preparation of sound estimates, or time standards, is one of the most important functions of job planning, as practiced at Norfolk. Estimates are the bench mark for controls and the basis for job planning, scheduling and performance evaluation. Unless the estimates are accurate the Controlled Maintenance Program will fall short of its goal.

Estimates prepared by the Planning & Estimating Division are classified into four different types: 1. Preliminary estimates; 2. Detailed estimates; 3. Contract estimates; 4. Budget estimates.

Estimating Job Costs

Preliminary estimates are reasonably accurate but are not based on a detailed breakdown of labor and material. In some cases these estimates are no more than an educated guess. On many of the smaller jobs an experienced estimator can quote a reasonable figure after merely reading the request.

Detailed estimates, or time standards, as used in the Controlled Maintenance Program, are for work to be performed by specific job orders. See Figs. 4 and 5. As a rule they do not estimate work under $50.00 inasmuch as it is uneconomical to do so. These detailed estimates are based on a breakdown of itemized lists of labor and

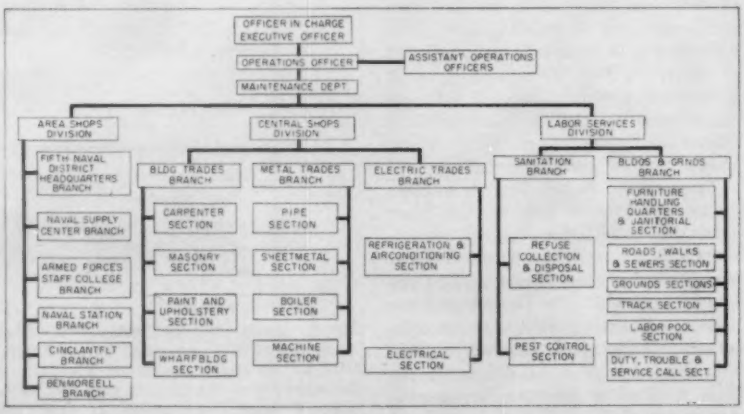


Fig. 7. Organization chart of shop scheduling organization at Public Works Center, Norfolk. Work control is the responsibility of Progressman only

*"Customer" in this instance means any of the activities or separate commands located at or near the Naval Base for which the Public Center does maintenance work on a "cost" basis much as would an outside contractor. Examples at Norfolk would be the Naval Station, or the Naval Supply Center which are separate components of the Naval Base.

costs for various portions of the work. Bills of materials, sketches or drawings are used in conjunction with these estimates, if necessary.

Contact estimates are prepared when it is known that the work will be let out on contract. In the preparation of these estimates by the Planning and Estimating Division they have found it necessary to consider overhead, profit to the contractor, equipment rental, and similar factors of cost incidental to contract work.

Budget estimates are prepared by the Planning and Estimating Division for use as substantiating evidence in requests for funds. These requests may be for regular maintenance funds, for special programs, or special projects. Estimates for labor and material for routine recurring maintenance such as janitorial services, trash and garbage disposal are computed using past performance records.

Maintenance Control

Thus, in summation, one of the prime functions of the Maintenance Control Department is to plan and carry out inspection procedures leading up to the issuance of a work order to the maintenance shops. This places in their hands the responsibility for initiating and scheduling what are fundamentally preventive maintenance jobs.

As was pointed out earlier, the greater percentage of work that can be "generated" in this manner the greater the control possible over the workload going into the maintenance shops. The Maintenance Control Department is the nerve center of the Program. Its Director is an engineer, C. F. Campen.

Shop Operations

Shop planning and shop scheduling under the Controlled Maintenance Program are well thought out. Furthermore, it is this portion of the Program that can be most readily adapted to the industrial organization.

Before discussing the operation of the Maintenance Department it might be well to consider the make-up of the Department personnel-wise. At Norfolk the Master Mechanic is G. J. Butcher, Fig. 6, who heads that department. Directly under him are the foremen in charge of the Central Shops Division; the Area Shops Division; and the Labor Services Division, shown in Fig. 2. These Divisions are in turn separated into Branches and Sections headed by Chief Quartermen; Quartermen; and Leading men. In addition, the Master Mechanic has, on a staff level, a Progressman and Progress clerk who work together to maintain work progress charts and work

MATERIAL AVAILABILITY REPORT
SHD PWC-250 (Rev 2-53)
To: PROGRESS CONTROL SECTION _____ DIVISION JOB ORDER _____

Is material to be used by your forces available? ☐ YES ☐ NO

If your answer to above question is "No":
Have you started procurement proceedings by issuing appropriate requisitions? ☐ YES ☐ NO

Based on best available information, on what date will material be available? _____

Explain any operating problem you foresee which may be experienced by your forces. _____

SIGNATURE	WORK CNTR	DATE

Fig. 8. Upon receipt of a job order each interested Work Center is provided two copies of same. Attached to job order is this blank form which is authority for the work center to procure the necessary materials and have held for specific job

center loading information. This latter function prevents the overloading of any one work center (craft) and acts as liaison on progress between top management and middle management.

Middle management consists of the Chief Quartermen (shop superintendents) who are in charge of the three Divisions, and who coordinate the operations of and the completion of work by the different branches.

Operational management consists of the quartermen (foremen) who are in charge of the various Branches and supervise their own work centers or area shops.

WEEKLY SUMMARY OF SCHEDULED PERSONNEL

WEEK OF 28 Feb.

WORK CENTERS	BUILDING TRADES					METAL TRADES				ELECTRICAL TRADES			LABOR FORCES	DIVISION TOTAL
	12	15	18	19	23	13	14	16	17	24	25		40	(Information)
Total Available for Specific Job Orders	150	150	125	20	50	95	115	100	60	30	100		250	From Work Status Report
Deduction for Unscheduled Job Orders	40	20	15	0	10	14	25	15	50	10	60		50	Estimated
Available for Scheduled Job Orders	110	130	110	20	40	81	90	85	10	20	40		200	Net
Scheduled Previously	65	87	81	10	40	36	10	21	0	8	5		92	Taken From Schedule Boards
Scheduled This Week	8	10	9	3	0	4	3	20	6	4	8		8	Each entry represents a new scheduled job.
	1	2	12	5		15	15	25			5		20	
	10		6	1		20	15	12			2		12	
	5					5	10						10	
							9						2	
							2						15	
							1						16	
							9						10	

NOTE! - 1. THIS FORM IS USED BY PROGRESSMAN IN DETERMINING THE USE OF PERSONNEL IN RELATION TO SCHEDULED LABOR ON NEW PROJECTS, PROJECTS BEHIND SCHEDULE AND THAT ON THE RESERVE FOR UNSCHEDULED AND INFORMAL WORK.
2. THIS IS THE FIRST STEP IN PREPARING TO SCHEDULE WORK TO SHOPS FOR THE NEXT WEEK.
3. TOTAL SCHEDULED IN SOME CASES HELD DOWN TO ALLOW SHOPS TO ACCOMPLISH PROJECTS ON WHICH THEY ARE BEHIND SCHEDULE.

TOTAL SCHEDULED	89	99	108	19	40	80	74	78	6	12	20		185	

Fig. 9. Weekly summary of scheduled personnel. This form is the primary base on which the scheduling of new work is furnished each week to the Work Centers

Fig. 10. Maintenance Department, Public Works Center, Scheduling Organization. Left to right, around table: C. E. Hobbs, D. B. Smith, H. Spence, M. E. Nelson, and P. A. Lemons; Mrs. Edith Berry, standing. The mechanics of scheduling is a continuous operation during the course of a week with the actual schedule to each Work Center being confirmed on Thursday in conferences such as this one

Direct supervision consists of the leadingmen (straw bosses) who are in charge of the various Sections, and are delegated the responsibility of completing specific job assignments. This organization set-up is shown in Fig. 7.

All work of the various types is received at a central desk in the Maintenance Department. Here it is distributed, recorded, recalled, and eventually closed-out upon completion of the work. This operation forms a part of progress control. Under this system no work flows directly to a shop, or from shop to shop, bypassing the administrative control.

Types of work received may be classified under five main headings: 1. Routine Recurring Work; 2. Trouble/Service Authorization; 3. Minor Specific Job Orders; 4. Major Specific Job Orders; 5. Intershop Orders.

Routine Recurring Work

Routine recurring work is generally against a standing job order and includes such work as garbage collection, janitorial work, etc.

Trouble/Service calls may be subclassified as: (a) Trouble calls being that work which is an emergency by nature and entails a breakdown; and (b) Service calls being that work which is relatively minor in scope (less than 2 man days) but not an emergency by nature.

Minor Specific Job Orders (also called "Pot Boilers") are specifically authorized items of work involving only one work center with less than 5 man days and/or involving more than one work center having a total of 3 man days or less. The Progressman parcels these pot boilers out to the various work centers or crafts as he sees that work center's or centers' backlog of specific project work declining.

Major Specific Job Orders are items

WORK CENTER SCHEDULE
SHD PWC-216 (Rev 7/54)

Week of 14 February

JOB ORDER NUMBER	C O D E	JOB DESCRIPTION	ACT CST	MAN DAYS SCHEDULED DAILY M	T	W	T	F	OT	Weekly Total	SUPERVISOR
900090		Transportation (Regular)	A								
			E							5	
900193		Water Lines	A								
			E							20	
900195		Power Plant (Regular)	A								
			E							10	
900200		Steam Distribution (Regular)	A								
			E							20	
386307		Pier 4 Repairs	A								
			E							15	
386914		Pier 7 Repairs	A								
			E							3	
420908		MH-26, Steam Lines	A								
			E							21	
901184		A-103, Int. Plumbing	A								
			E							5	
961014		SP Area, Steam Lines	A								
			E							9	
961022		Z-140, Shop Conv.	A								
			E							8	
961127		SB-142, Steam Lines	A								
			E							10	
962806		T-28, Dishwasher	A								
			E							1	
964814		S-53, Steam Lines	A								
			E							2	
901477		P-71, Plumbing	A								
			E							1	

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Fig. 11. Work Center Schedule (going to the shop). This form is used following operations from the "Weekly Summary of Scheduled Personnel." Man days are scheduled to the shops only in weekly totals. Quarterman in Charge assigns and pro-rates totals as his work load justifies

WORK CENTER SCHEDULE
SHD PWC-216 (Rev 7/54)

Work Center 13 (Pipe Shop) Week of 14 February

JOB ORDER NUMBER	C O D E	JOB DESCRIPTION	ACT CST	MAN DAYS SCHEDULED DAILY M	T	W	T	F	OT	Weekly Total	SUPERVISOR
900090		Transportation (Regular)	A							0	A/L
			E	3	3					5	
900193		Water Lines	A	5	5	6	2	5		23	Emergency
			E	5	5	5	5	5		20	
900195		Power Plant (Regular)	A	2	2	2	2	2		10	
			E	2	2	2	2	2		10	
900200		Steam Distribution (Regular)	A	5	5	5	2			17	A/L
			E	5	5	5	5			20	
386307		Pier 4 Repairs	A	5	3					8	"
			E	5	5	5				15	
386914		Pier 7 Repairs	A								"
			E				3			3	
420908		MH-26 Steam Lines	A	4	2	6	6	3		21	
			E	3	3	4	6	5		21	
901184		A-103 Int. Plumbing	A		2	2				4	Complete
			E	1	1	1	1	1		5	
961014		SP Area, Steam Lines	A	4	4	4	4			16	do
			E	2	2	2	3			9	
961022		Z-140, Shop Conv.	A		1			1		2	
			E		2	3	3			8	
961127		SB-142, Steam Lines	A				5	5		10	Complete
			E		2	4	4			10	
962806		T-28, Dishwasher	A	1						1	Complete
			E	1						1	
964814		S-53, Steam Lines	A			2				2	Complete
			E			2				2	
901477		P-71, Plumbing	A		2					2	Complete
			E		1					1	
			A								
			E								
		Labor on Previous Schedule	A								
			E				5	3		8	
962013		Steam Lines (Covering)	A								
			E								
962608		Dog. Sta. Steam Lines	A	4		2	2	2		10	Complete
			E								
410137		CA-33, Steam Lines	A		1					1	
			E								
961232		Unit "A", Steam Lines	A			1	3	2		6	Complete
			E								
			A								
Notes:	*	Bad Weather	A								
	**	Stamped up by Authority	E								
			A								
			E								
			A								
			E								
			A								
			E								

NAVY-OPPO SHD Norva

Fig. 12. Work Center Schedule (returned from the shop). Progress Control posts the Master Schedule Board from the actual accomplishment under weekly totals against those scheduled when form is sent to shop. Schedule is sent to shop on Fridays; is returned week from following Monday

SUPVR. AND JOB ORDER	M		T		W		T		F		S		S		TOTAL MD SCHD WEEK OF	TO DATE	OF JOB	JOB STATUS (±)	JOB DESCRIPTION (6-13-55)
	E	A	E	A	E	A	E	A	E	A	E	A	E	A					
DAVIS																			
941017	20	20	20	19	20	19	20	18	20	16		15			100	285	468	+84	AFSC EXITS
941023	1	1		1	1	1	3	1	6			13			5	260	290	+13	BLDG 59 BEN'M
693094															2	70	80	COMPL	SDA BLDG #242
963848	½															28	35	-½	NH-3
084439																1	5	-2½	FSS-22
963093																6	10		SDA-242
WEAVER																			
500527	2		2	1	2		2								8	23	35	-4	HB-26
908069	2		2		1		1								6	35	44	-1	A-81
908081	1		1		1		1								4	1	4	-3	A-81
908082	4	3	4	3	4	5	4	7	4	6		3			20	12	50	+8	A-81
949016	5		5		5		5		5						25	48	119	+4	SB-142
FINCK																			
961818																62	66	-15	A-53
901659			5		3												10		BLDG 88 PART
961281			2½	2	1½	2	1								4	10	22	-8	N-19-A
964838																0	3	-3	8KS "K"
901653																18	19	-1½	K88 PART
LAUGHBAUM																			
965754					½										7	8		COMPL	HDU REPAIRS
901695					½				½									COMPL -E	SCHED BDS
911035					1		1		1						0	9	-5		BEN'M FURN.
900180															13	25	+4½		HQ FURN.

SUPVR. AND JOB ORDER	M		T		W		T		F		S		S		TOTAL MD SCHD WEEK OF	TO DATE	OF JOB	JOB STATUS (±)	JOB DESCRIPTION (6-20-55)
	E	A	E	A	E	A	E	A	E	A	E	A	E	A					
DAVIS																			
941017	20		20		20		20		20						100	392	468	+91	AFSC EXITS
941023	3		3		3		3		3						15	283	290	+31	BLDG 59 BEN'M
420441	1		1												2		2		AFSC STREETS
963848																28½	35		NH-3
084439																1	5	-2½	FSS-22
983093																6	10		SDA-242
961275			1												1		1		NH-45 VENT
WEAVER																			
500527																24	35	-11	HB-26
908069																35	44	-7	A-81
908081																1	4	-7	A-81
908082	4		4		4		4		4						20	39	50	+15	A-81
949016																48	119	-21	SB-142
FINCK																			
961818																62	66	-15	A-53
901658	2														2	8	10	+8	BLDG 88 PART
961281																15	22	-7	N-19-A
964838																0	3	-3	8KS "K"
901653																18	19	-1½	K88 PART
901706					1										1		1		F-32 PATIO
LAUGHBAUM																			
901704	2		2		2		2		2						10		10		A-81 HEAD
962625			1		1		1								3		3		DEG. STA.
911035																3	9	-2	BEN'M FURN.
900180																13	25	+4½	HQ FURN.

Fig. 13. Work Center Schedule Board, Carpenter Shop. Typical schedule board showing progress of jobs with both estimated and actual man hours. This board permits at-a-glance determination of jobs behind schedule as well as ahead of schedule. The "E's" and "A's" at top of board, directly under days of the week, represent "Estimated" and "Actual" man hours

of work involving one work center requiring five days or more or more than one work center requiring in excess of three man days.

Intershop orders are items of work issued from one Quarterman (foreman) to another quarterman (via the receiving desk) covering an unforeseen item of work in the estimate, under $100. These are subject to approval by the Chief Quarterman. The same procedure is used when necessary to accomplish an emergency item of work against a standing job order.

Teletype transmissions are used to authorize trouble and service calls, together with amendments to and cancellations of job orders.

Let's Follow an Order

Obviously, it would be impossible in the space of a few pages, to completely detail the functioning of the shop's personnel on each type of order. So, let's follow a major specific job order through the shops.

Considerably more involved explanation would be necessary in order to describe much of the procedure that has now become routine in actual shop practice. However, the procedures outlined here are substantially complete.

Immediately upon receipt of the specific job order we have in mind, the central desk in the Maintenance Department turns it over to the head of the Department, the master mechanic. He and other top management personnel give it a cursory review. Such inspection is helpful to expose items of an unusual nature which might impede the progress of the work. For example, work which might require materials of a critical or scarce nature, entailing long lead time.

Making certain that materials called for in the job order are on hand is highly important, too. Therefore, a copy of the job order is furnished immediately to each involved work center or Branch head (quarterman) along with a "materials availability report." Fig. 8. This is an authorization to the Quarterman to order the materials and also serves notice that such materials will be needed for this specific job.

If the materials are in shop stores they are earmarked for this particular job order. If not in shop stores they are ordered and the Quarterman obtains the best possible delivery date and the delivery information is put in a tickler file. Information on the status of material is then returned to the progressman.

While this is going on progress control will have recorded the job data on the progress data card. The same information will have been inserted on the master scheduling board pending future scheduling.

Scheduling Personnel

This master scheduling board is one of the most important adjuncts to the Progress Control set-up. 1. It provides an orderly, visual method of Progress Control filing; 2. It permits an overall perspective of work ready to be scheduled in the various work centers; 3. It provides quick comparison, when the job is scheduled, between estimated time and actual time.

The next operation is that of breaking down the job order for each work center that is to be involved in the job. This is done on the Job Schedule Form, used to indicate the allotment of man days given by the Maintenance Control Department to that particular work center. The assigned labor scheduled on a weekly basis to each respective work center is determined by the Progressman in liaison with the interested Chief Quarterman.

Determination of available personnel is the next and the most difficult of all operations in advance of scheduling. Out of the total labor force there is an unknown number of men

Fig. 14. O. L. Loper, Administrative Officer and Capt. R. Lamoreaux, Officer in Charge, Public Works Center, U. S. Naval Base, Norfolk, confer on cost control

who will be absent on any given day. Also, there are a certain number of craftsmen who must be utilized on emergency or unscheduled orders. Furthermore, some of those on scheduled orders will still be employed on these orders from the previous week's jobs.

Therefore, it is necessary to determine in advance of scheduling, the number of men available for scheduling on this particular work. The form used is shown in Fig. 9. The raw material for scheduling has now been turned into a finished product.

Next step is for progress control to post the master boards in the progress room, from the schedules that were made for each specific job. Now, the scheduling group — progressman and the chief quarterman (See Fig. 10) — meets for two hours on Thursday morning to give final clearance on all jobs scheduled for the following week.

Posting Master Boards

This schedule, Fig. 11, is then delivered to each interested quarterman on Friday morning. The following week the same form, Fig. 12, with "Actual Manhours" entered, is returned.

Each work center also has a scheduling board and the delivered job orders, as posted on this scheduling board, constitutes authority to the leadingman involved to proceed with the work. The carpenter section's scheduling board is shown in Fig. 13 on the preceding page.

As previously mentioned, materials for the jobs to be scheduled have already been ordered and were, let's assume, on hand in shop stores earmarked for use.

One daily chore for the leadingman is to post, on the work center board, actual man days expended on job orders against the number of estimated man days.

At the end of the week the quarterman posts the total of the man days used on each job directly opposite the scheduled number of man days. Any reasons why work was not on schedule are also listed; this might include bad weather, etc. The final job for the quarterman is to return his work center schedule to progress control where the data will be used to bring the master schedule up to date.

Management Reports

Management reports generate various statistics and information for Public Works management, to facilitate analysis of the performance of work forces. Job orders are coded to show the work center (carpenter, etc.); how the work was generated (trouble call, inspection, customer request, etc.); overhead (i.e. indirect and non-productive time) and other similar data. The job order also shows the estimated labor and material requirements by each work center.

This information is key punched on electric accounting machine summary cards. As work progresses, labor and material expenditures are reflected on these cards. Therefore, any combination of reports can be readily run off.

An example of the type of reports that are made available is one that shows the amount of work generated by various categories. This tells management whether the pipe section (for example) is working on a disproportionate number of emergency jobs and if so, it can immediately investigate the reason.

The reports provide management with accurate and current information on the status of expenditures against Specific Job Orders. The reports also provide data on the productivity of the various work centers by showing amounts expended on direct labor and amounts expended on indirect and non-productive time.

There are numerous other combinations of statistics that can be cranked out of the system with little difficulty and which permit management to be on top of his department at all times. As a by-product, cost statistics can also be developed which, after enough historical data have been accumulated, will give more accurate unit costs for maintaining the diverse types of facilities in the Naval Shore Activities.

In summation, management reports facilitate the gathering of that type of information which is required by all levels of management to keep score properly and to operate in a business-like and efficient manner.

Advantages of System

Some of the advantages of this system are that it brings about: more realistic estimates; improved shop coordination; increased shop production; better direct control of labor; fewer job delays because of better material procurement and equipment scheduling; improved control of materials; less detail for supervisors in the field; and that it fosters initiative.

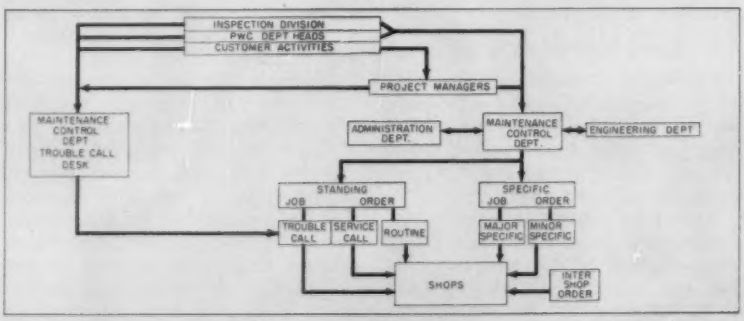


Fig. 15. These are the routes taken by specific job orders and standing job orders in Controlled Maintenance Program designed for use in shore facilities

GM's Lab Sewage Plant

Takes on Variety of Waste Problems

FRED H. COUTS, plant engineer for General Motors' Technical Center Service Section, describes the sewage treatment plant as a trickling filter type unit. It is distinctive from other sewage plants because the laboratory has to keep a "tight" control of the effluent.

Emphasis on control results from the fact that treatment problems differ from waste disposal in an assembly or manufacturing operation where industrial wastes, generally speaking, occur in a regular cycle. Both volume and composition usually are a matter of routine.

At the Technical Center, however, most of the work at Research Laboratories Division, Process Development Section and Engineering Staff is experimental. The complexity and variety of wastes pose new problems continuously.

Special Treatment Measures

Thus, at the Research Laboratories and the Process Development section, for instance, special treatment measures are taken at the source of disposal, prior to arrival at the sanitary or storm control system. Analyses at both points assure adequate neutralization of such contaminants as plating and metal treating fluids, oils and wastes from various chemical laboratories.

The treatment system includes the following components: 1. Primary wet well; 2. Primary filter tanks; 3. Secondary filters; 4. Final treatment or filter tank; and 5. Chlorinating chamber.

Sewage enters through a comminutor, a machine that grinds up large chunks of solids. From there it moves to the primary wet well.

Next, it is pumped into the primary filter tank at a rate of flow that settles out suspended solids. A skimmer removes suspended material to a sludge hopper at the bottom of the primary filter tank and effluent flows over weirs and out to a secondary filter.

The secondary filter is a circular tank with four feet of fairly large, very clean stone. The effluent is fed by gravity flow through four arms that pivot on a center pillar. Spray nozzles are spaced 8 to 10 in. apart on the arms which completely cover the tank.

Flow through the nozzles sets the speed of rotation. Effluent is sprayed over the stones, trickles down and drains to the center. Biological growth digests the bacteria in the sewage.

From this stage the effluent moves to the secondary wet well and is pumped into the final settling tank. Any remaining suspended solids again are permitted to settle off and be swept out and the effluent again passes over weirs to the chlorinating tank.

Near the end of the secondary settling tank, chlorine is introduced. At the far end of the tank is a sampling point from which samples are pumped back into the treatment plant's laboratory for immediate analysis.

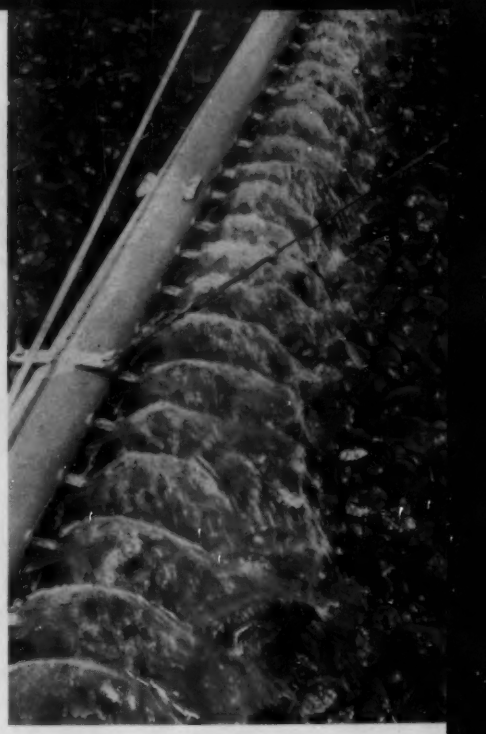


Fig. 1. At secondary filter stage, effluent is gravity-fed through nozzles and is sprayed over stones for draining

Laboratory work in the plant consists of determining volatile solids, suspended solids and the five-day biological order of decay. Throughout the entire system there are check points so that the condition of wastes can be determined quickly.

Each tank in the system is divided into two sections so the effluent can be recirculated for further treatment, if necessary, without interrupting the overall treatment cycle. At completion of the cycle, water flows into Bear creek along Twelve-Mile Road, which borders the southern end of the Technical Center site.

Suspended solids which have been skimmed and deposited in the sludge hoppers in the primary and final filter tanks are pumped to a sludge well and from there are periodically removed by tank truck from the site and burned.

Each month a copy of data covering the plant's operation is sent to the Michigan water resources commission.

A major problem at this particular plant and one requiring extremely close control is the elimination or neutralization of metallic, oil or other toxic wastes before they reach the biological growth in the filter tanks. A relatively small amount of such contaminants can damage or wipe out the biological growth.

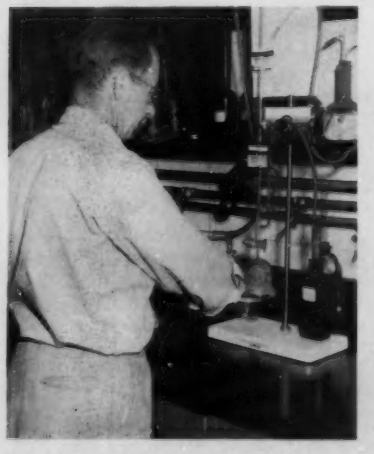


Fig. 2. Laboratory analysis of sewage plant effluent is checked periodically

Fig. 3. Chlorinator, right, checks the quantity of chlorine used in treatment

Fig. 1. Car's dashboard grill assembly is drilled complete in 14 seconds. Fifteen holes of various sizes and depths and angles are drilled in an automatic cycle — the operator simply clamps the work in the fixture and presses the starter

Compressed Air Supply—
Make Sure It's Adequate If You Use Multi-Spindle Tools

WHEN A PLANT HAS been in business for a long time, new equipment puts a strain on its power services. One good reason for new equipment these days is the need for automation. Many plants that have been operating for 35 years are installing automation such as multi-spindles to do the work of many hands. The initial cost of the multi-nutsetter should not be misinterpreted as an obstacle, for few mechanical devices pay back greater returns. The savings of only one operator will pay back the initial investment in only a few months.

It is now commonly accepted that the multi-nutsetter is here to stay and it can drive two or more screws or nuts with controlled torque with one operator. It does not require an expert or specialist to make the installation. A multi-nutsetter is in reality, only individual nut setters grouped together and is easier to adjust and control than the same number of individual units.

Machines have been designed for multi-nutsetting use, or screw driving in close grouping and with short center distances, developing closer torque than any former tools on the market, of their weight and size.

There are tools that will develop more than 125 foot pounds torque in the 12 pound weight class with ¾ in. center spacing of spindles. There are also tools that develop more than 200 foot pounds torque in the 33 pound weight class with 2-5/16 in. center spacing of spindles.

Air supply for these multi-units must be greater than actually needed to guarantee successful operation. See Fig. 2. Multi-nutsetters are best operated at a lower than line pressure to assure constant pressure for each machine in the unit.

Need Constant Pressure

Air supply and constant pressure for the successful operation of a multi-nutsetter should be taken into consideration when considering multi-tool units or with a group of machines operating simultaneously.

Approximate air supply required for operating the machines at 80 to 90 pounds pressure, is as follows:

Torque 1 to 30 ft lb—25 cfm air
Torque 30 to 50 ft lb—35 cfm air
Torque 50 to 100 ft lb—70 cfm air
Torque 100 to 200 ft lb—100 cfm air

From this data, one can estimate that a five-spindle multi-ool unit delivering torques of 50 to 100 foot pounds must have available, at the machine, a constant air line pressure of 80 to 90 lb and actually consuming approximately 350 cfm of air while the machines are in operation. The air supply, pipe line and hose size must meet these requirements. It must be taken into consideration that only when machines are in actual operation do they consume air, and any single operation averages less than 5 seconds. Therefore, the air consumption of a five-spindle multi-tool unit is approximately 30 cu ft of air per cycle of operation, or 6 cu ft per screw or nut driven.

The air consumption is no greater than air consumption of five individual nutsetters driving the same number of nuts or bolts.

There is no problem to torque-rating machines on known factors, but nutsetting and screw driving operations have so many unknown factors that to torque rate machines to meet all conditions is a difficult problem.

It is advisable to mount an air gage directly in the airline on manifold of the nutsetter, to avoid all guess work on air pressures. Readings should only be taken when the unit is in operation, for uniform pressure and only uniform pressure, will ac-

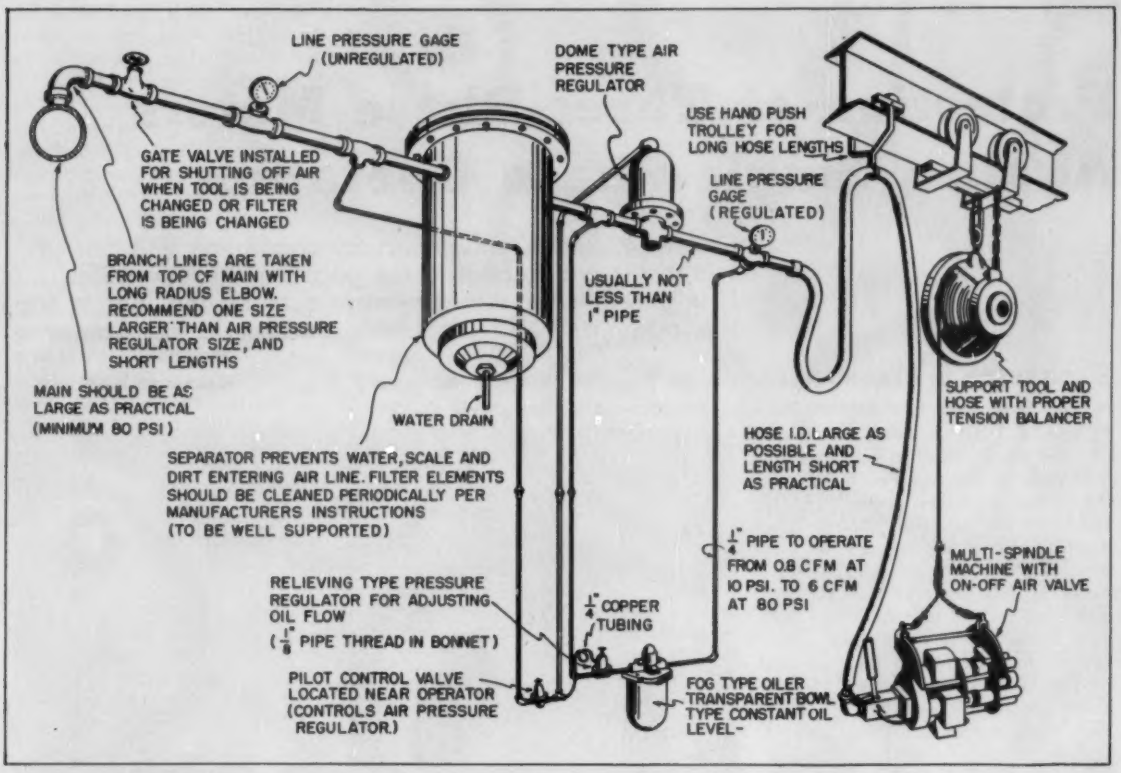

LINE PRESSURE GAGE (UNREGULATED)
DOME TYPE AIR PRESSURE REGULATOR
USE HAND PUSH TROLLEY FOR LONG HOSE LENGTHS
GATE VALVE INSTALLED FOR SHUTTING OFF AIR WHEN TOOL IS BEING CHANGED OR FILTER IS BEING CHANGED
LINE PRESSURE GAGE (REGULATED)
BRANCH LINES ARE TAKEN FROM TOP OF MAIN WITH LONG RADIUS ELBOW. RECOMMEND ONE SIZE LARGER THAN AIR PRESSURE REGULATOR SIZE, AND SHORT LENGTHS
USUALLY NOT LESS THAN 1" PIPE
SUPPORT TOOL AND HOSE WITH PROPER TENSION BALANCER
MAIN SHOULD BE AS LARGE AS PRACTICAL (MINIMUM 80 PSI)
WATER DRAIN
HOSE I.D. LARGE AS POSSIBLE AND LENGTH SHORT AS PRACTICAL
SEPARATOR PREVENTS WATER, SCALE AND DIRT ENTERING AIR LINE. FILTER ELEMENTS SHOULD BE CLEANED PERIODICALLY PER MANUFACTURERS INSTRUCTIONS (TO BE WELL SUPPORTED)
1/4" PIPE TO OPERATE FROM 0.8 CFM AT 10 PSI. TO 6 CFM AT 80 PSI
MULTI-SPINDLE MACHINE WITH ON-OFF AIR VALVE
RELIEVING TYPE PRESSURE REGULATOR FOR ADJUSTING OIL FLOW (1/8" PIPE THREAD IN BONNET)
1/4" COPPER TUBING
PILOT CONTROL VALVE LOCATED NEAR OPERATOR (CONTROLS AIR PRESSURE REGULATOR.)
FOG TYPE OILER TRANSPARENT BOWL TYPE CONSTANT OIL LEVEL-

Fig. 2. Suggested piping and equipment installation for multiple spindle tool operation. Multi-spindle tools are best operated at lower than line pressure to assure constant pressure for each of the individual machines in the unit

complish the needed uniform torque.

In a practical installation of a multi-nutsetter the air line on the tool is taken from main feeder line and after the separator, to eliminate condensation and dirt. There are other protective measures such as moisture separators and filter units in the air line of the unit. The line lubricator is necessary for constant lubrication, for long uninterrupted service, and low maintenance cost.

Most multi-tool units can be furnished with power push-off rod or ejector which works automatically, pushing the sockets off the nuts or bolts when machine is shut off. This will speed up operation and cut down labor fatigue.

Illustrations and data courtesy Compressed Air and Gas Institute, Cleveland, Ohio

AIPE Luncheon—Philadelphia Club Will Be Host

On Tuesday, January 24, 1956, the Plant Engineers' Club of Greater Philadelphia will be the host at the American Institute of Plant Engineers' Luncheon planned for this day. The luncheon will take place at Convention Hall at 11:30 a.m.

Oscar Graveley, Director of Maintenance, Office of the Assistant Secretary of Defense, Properties and Installations will be the main speaker on the luncheon program. He is on leave from his position as plant engineer at the Niagara Falls, N. Y., plant of the Union Carbide and Carbon Corp. His talk will discuss the New Maintenance Management Control System of the Department.

Plant engineers who plan to attend the Plant Maintenance and Engineering Show and Conference and who would like to include the luncheon on their schedule, should fill in the coupon appearing on this page and mail it to Mr. Johnstonbaugh of United States Rubber Co. The price for the meal is $6.00 per person which includes the cocktail hour preceding the luncheon.

This will be your chance to say "hello" to the many plant engineers whom you have corresponded with during the year and may have not seen since last year's Plant Maintenance and Engineering Conference held in Chicago.

Mr. Eugene G. Johnstonbaugh
United States Rubber Co.
Cottman and Keystone Sts.
Philadelphia 35, Pa.

I plan to attend the American Institute of Plant Engineers' luncheon to be held on Tuesday, January 24, at Convention Hall, Philadelphia. Please make a reservation for me.

☐ **I am a member of the _____ Plant Engineers' Society.**

☐ **I am not a member of a plant engineers' society, but I would like to see one organized in the city of _____.**

Name _____ Company _____

Title _____ Company Address _____

Protection of Three-Phase Motors Against Single-Phase Operation

Overload relays under certain conditions will not protect motor windings in three phase motor operation . . . It is possible for the line current to be too low to trip the relay and yet the phase current to be excessive

By **CHESTER E. OLSON**, Control Design Engineer, Electric Machinery Mfg. Co., Minneapolis, Minn.

THREE PHASE motor controllers are usually supplied with an overload relay in each of two phases, as the minimum required under NEMA standards for industrial control. The overload relays are selected so that they will trip in approximately two hours at 110 per cent and 115 per cent of motor full load rated line current. In most three phase motor applications, overload relays thus selected provide adequate protection for the motor under all conditions of overload including locked rotor current and single phase operation (but not necessarily including short circuits).

Under certain conditions of accidental single phase operation, however, the standard overload relay arrangement may not protect the motor windings. Here, a thorough analysis should be made and proper overload protection or special open-phase protection should be specified, depending on the degree of protection desired for the motors. In most cases, an overload relay in the third phase is an adequate additional safeguard, assuming that the motor is to operate at rated load, or nearly so.

Following is a discussion of a number of situations in which protection should be considered, either by adding a third overload relay, or by means of a special open-phase relay:

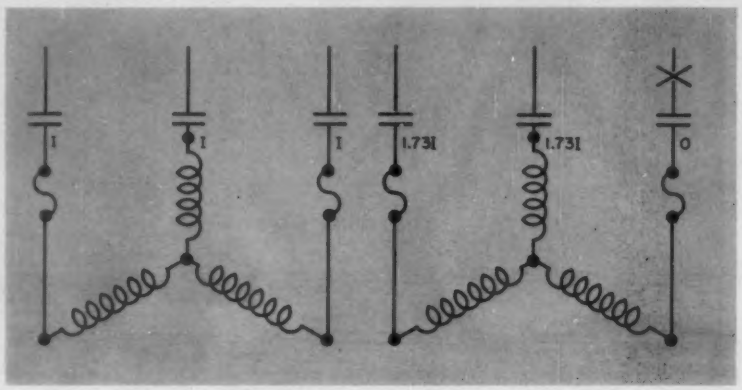


Fig. 1. Line currents in normal and an open phase operation of wye wound motor

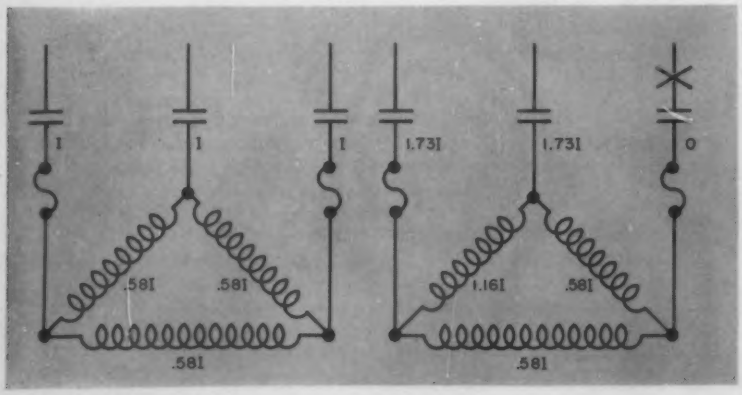
Wye Connected Motor Not Fully Loaded—If the motor is to carry a normal load less than its rated full load, the overload relays should be selected on the basis of normal load rather than rated full load. This also applies to a delta connected motor. Where a varying load is to be handled, a special open-phase protective relay will have to be used to provide full protection.

Figures 1 and 2 show normal currents and the change caused by opening of one phase. Note that two overload relays will protect against single phasing when set at 1.1I to 1.15I, and the relays will trip in a relatively short time. Quick tripping is especially desirable for the delta connected motor where it will be noted that one phase carries twice its normal current when operating on single phase accidentally.

Delta Connected Motor Not Fully Loaded—In a delta connected motor each phase winding carries 58 per cent of the line current during three phase operation, as shown in Fig. 2. Thus, if the overload relays are set to trip at 1.51I, the phase current at this overload will be 67 per cent of normal. Under certain conditions of load and single phase operation, the phase current can exceed a safe value, and yet the line current will remain too low to trip the overload relay. See Figure 3.

Note that one phase now carries a 15 per cent overload, yet the line current is still far below the overload trip setting. The relays would be very unlikely to trip, and the motor could therefore be damaged. Since the three-phase current would be 100.5 x 100/173,

Fig. 2. Open phase in delta wound motor shows comparatively high phase current



or 58 per cent. Below this value, the phase current would be too low to cause damage. At a line current of 1.151, with one open phase, the three-phase current would be 115 x 100/173, or 66.5 per cent. Above this valve, the overload relay will trip. Therefore, in a load range of 58 per cent to 66.5 per cent, the overload relays give only doubtful protection to the motor under single-phase operation, and special protection should be considered.

The open-phase relay operates on phase unbalance of about 25 per cent or an unbalance that allows 100 per cent to flow in one phase. It has elements, either in series with the motor leads or in secondaries of current transformers in the leads, which are energized by the motor currents and cause forces to be set up in a disk such that the disk remains stationary when currents are balanced. Unbalanced currents, due to open phase or other causes, will unbalance the forces on the disk, which will then rotate and operate its contact, tripping the motor off the line. This relay will function while the motor is in operation, and if a single phase condition exists when starting the motor, the relay will quickly trip the motor off again.

A potential-operated open-phase relay is also available, but it may not function when the motor is running, since the motor under certain conditions of load will sustain the potential on the open phase line and prevent operation of the relay, which depends on potential unbalance for its operation.

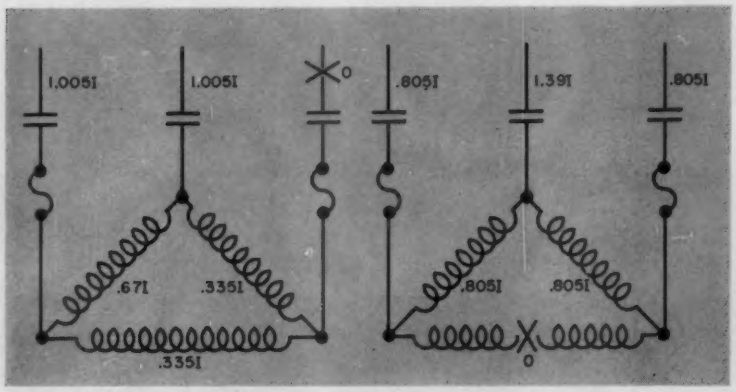


Fig. 3. Left, single phase operation; at right, running with phase winding open

A motor may also stop, if a phase opens while it is running fully loaded, or it may continue to run at high slip near pullout, and the high current in either case will hasten operation of the overload relay, if no special relay is used. A synchronous motor may also pull out of step and then be removed from the line in a few seconds by its out-of-step protective relay.

Where open-phase protection may be required, the application should be analyzed to determine whether the probability of damage to the equipment, caused by accidental single-phase operation of the motor, is sufficient to warrant the extra cost of protective devices (such as out-of-step protective relay on the synchronous motor control) in the system. When in doubt about degree of protection needed, consider using the open-phase current balance relay.

Color-Coded Safety Hats Make Men of Distinction

By LEON J. BAKER, Safety Director, Higgins, Inc., New Orleans, La.

NECESSITY of wearing hard safety hats has long been recognized by industry, but in our company the problem confronting us was not establishing their value, but persuading employees to wear them. Men rebelled against wearing the hats, giving various reasons from headaches to stiff necks. Ultimately, it was made compulsory to wear a safety hat on the job, and when everyone from president down, including Navy personnel and visitors, wore them, objections began to vanish. Now the hard hats are an accepted requirement.

Wearing safety hats, however, was only half the battle. No matter where one looked the hats were the same; they had no meaning except protection. Men from different shops and crafts could mingle with each other, some working and some not. This was especially so where many crafts might be engaged at the same spot, such as an engine room. Even foremen and supervisors had difficulty in determining who should be there and who should not.

Department	Color Code	Department	Color Code
Pipe	Red	Machinists	Red & Blue
Shipfitters	Blue	Shear & Blacksmith	Grey & white
Welding	Green	Sheet Metal	Green & white
Rigging	Buff	Expeditors	Lavender
Electrical	Yellow	General foremen	Aluminum
Labor	Black	Inspectors	Aluminum & black
Burning	Grey	Caulkers & Sanders	Brown & yellow
Carpenters	Brown	Emergency Units & First Aiders	White
Painters	Brown & white		

In our shipyard a novel plan was worked out. A color scheme was devised designating the different shops and crafts, as indicated in the table.

When a man is hired he cannot go to work until he checks out a hat. This hat is furnished by the company but charged to the employee. At the termination of his employment he turns in his hat and, unless it has been unnecessarily abused, he is given credit for it. If the correct hat size is not available immediately in the color necessary for his department, he is given a hat for temporary use.

When an employee is transferred from one department to another he turns in his hat to be repainted the color that will designate his new work.

This plan makes it possible to spot an employee drifting from one place to another, annoying men at their work and not working himself.

Another advantage of the plan is that it enables the supervising personnel to quickly spot a man needed for a particular job.

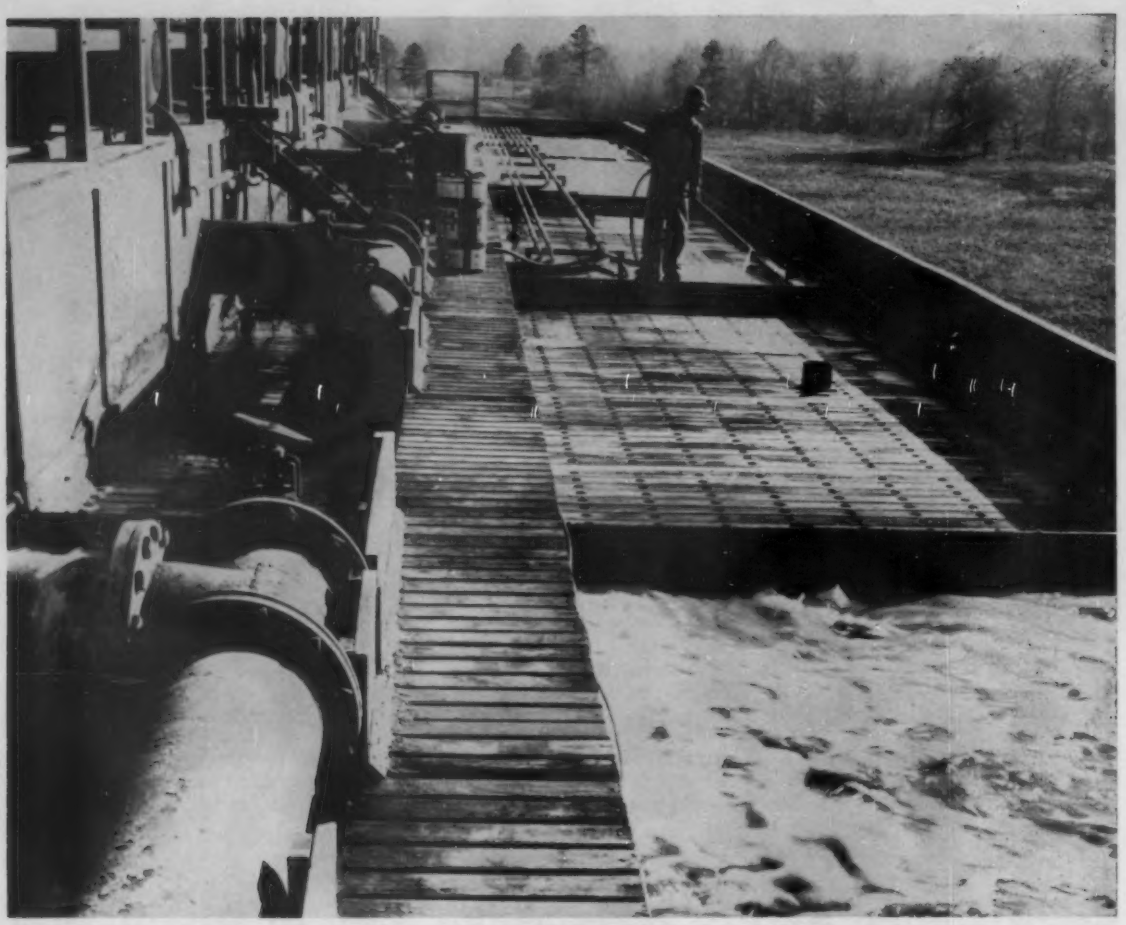


Fig. 1. Individual cells can be treated with the fungicidal chemical slurry while the rest of the tower cools water

Cooling Tower Preservation—

New Fungi "Fencing" May Eliminate Wood Deterioration

TINY FUNGI THAT HELP to shorten the service life of many cooling towers may be "fenced" out if a preservative treatment originally developed for fence posts by Dr. R. H. Baechler of the U. S. Forest Products Laboratory, Madison, Wis., continues to work satisfactorily in towers under test.

Redwood, which is widely used in cooling tower construction, has high natural resistance to the many effects of constantly recirculating water, but occasionally a tower will begin to deteriorate. This deterioration was blamed on chemical attack until tests run at the Forest Products Laboratory in 1949 proved that fungi were causing an important part of the trouble.

In more recent tests at the Institute of Paper Chemistry, nearly 100 species of fungi have been isolated that can get their carbon requirements directly from leached cooling tower wood.[1]

Because of the heavy investments many industries have in these towers, the problem of deterioration is being studied intensively. Chemical attack and erosion make the loss directly attributable to fungi uncertain, but examination of samples of wood from attacked towers indicates that it is heavy. Several methods of fighting fungi in towers have been suggested, but until now all have had some serious disadvantage.

Because biological attack is not merely a matter of time, and some towers are never severely damaged by it, common practice is to use untreated wood when building towers. Subcommittee No. 3 of the Cooling Tower Institute did not recommend the use of treated wood in a recent report, although such treatment may eventually prove to be a desirable safeguard. The problem of stopping further damage to the many towers already in use would still remain, however.

Labor cost of dismantling a tower for treatment after it is attacked is obviously prohibitive. Treating the wood in place with a water-soluble preservative would give only temporary protection, and flooding the tower with a preservative in an oil solvent would not only present a serious explosion and fire hazard, but protection would probably be slight because of the poor penetration of redwood heartwood by oils not under pressure.

[1]Study of Deteriorated Redwood Specimens from Cooling Towers, Project 1561, Progress Report No. 3 to the California Redwood Association, Nov. 1, 1952. p. 56.

A double diffusion process that sidesteps these critical disadvantages has been developed by Dr. Baechler. In his method, two water soluble chemicals diffuse separately into the wood. Once within the cells of the wood, they unite in a coalition against fungi by reacting to form a precipitate that resists the leaching effect of the recirculating water and kills infiltrating fungi.

How to Do It

First step in the double diffusion process is to spray the entire inside of the tower with a slurry of copper sulfate, which is allowed to diffuse into the water-logged wood for several days. For the second step, a slurry of sodium chromate is sprayed over the inside of the tower. As the sodium chromate diffuses into the wood, it reacts with the copper sulfate already there to form a precipitate of copper chromate, which is highly toxic to wood-destroying fungi. Since this precipitate is essentially insoluble, it is not easily leached from the wood by the quantities of water flowing through.

The first treatment was accomplished by recirculating the solutions through the tower without using the fans. The recirculation method of applying the chemicals required relatively large volumes of the solutions, however, and the spraying technique was adopted for subsequent treatments. Most tower treatments to date have been made with the copper sulfate-sodium chromate combination, although some modifications have been tried.

Other chemicals that are being field-tested on pine fence posts and may ultimately be used to treat towers are nickel sulfate or zinc sulfate plus arsenic acid in the first solution, and sodium fluoride, arsenate, borate, or phosphate in the second solution. The most practical combination of chemicals, from the standpoint of toxicity, absorption rates, initial cost, distribution of the absorbed chemicals within the wood, and corrosiveness, will not be known until the extensive field tests are completed.

By the end of 1955, about 40 redwood cooling towers containing over 7.5 million board feet of lumber will have been treated with nearly a million pounds of chemical by double diffusion. These figures include a number of towers treated by their owners and others treated on a commercial basis by a cooling tower manufacturer. What happens to these treated towers in the next several years will determine the value of double diffusion for cooling towers.

The cost of a double diffusion treatment for a cooling tower would depend on such factors as size of the installation and number of cells available for treatment at one time, but it has been calculated that the cost could be written off by a relatively small extension in the service life of the tower. Normally, an entire tower can be scheduled for treatment when the equipment it is serving is shut down for overhaul or regular maintenance.

A factor to be considered before treating a tower is the unusually large quantity of extractives found in new redwood. These extractives reduce the rate at which the wood can absorb the chemicals. They are toxic to wood-destroying fungi, however, and protect the wood until they are leached out. Under normal tower operation, it takes about one year to leach the extractives to a point where good absorption of the chemicals can be achieved. Towers are rarely less than three years old before fungi cause noticeable damage.

The original test involving the double diffusion process was started in 1941 with 100 pine fence posts. The posts were treated by total immersion in the two solutions, and then put in a test plot in Mississippi. After 14 years, 99 posts are still doing their job, and are in good condition. The average service life of untreated posts in that area is about three years.

Definite estimates of increased cooling tower life cannot yet be made, because of the short time that has elapsed since double diffusion treatments were first applied to towers. However, in September, 1952, a southern power company treated one half-cell of an eight-cell tower as an experiment. About a year later, the 7½ untreated cells had to be replaced. The treated half-cell is still cooling water, three years later.

And This Was How It All Started

Fig. 2. Dr. Baechler here illustrates a point on the treating of pine fence posts for which the double-diffusion process was developed

Conveyors "Zip" Through Their Chores At These Two Installations

Zipper conveyors have minimized maintenance problems at these two installations: . . . At the B. F. Goodrich plant, the conveyor has helped reduce a dust problem . . . At American Cyanamid, the conveyor eliminates spillage of corrosive chemicals, thereby cutting the maintenance costs considerably

Photos: Stephens-Adamson Mfg. Co.

Figs. 1 and 2. At the Goodrich installation, this conveyor transports pelletized carbon black from the track hopper to the elevator section, lower left, to the top of the overhead storage bin. One motor and speed reducer power the unit

TWO ZIPPER conveyor-elevators installed recently at a B. F. Goodrich plant and an American Cyanamid plant have minimized the maintenance problems from handling corrosive chemicals and carbon black pellets.

The Goodrich installation at Oaks, Pennsylvania, combines in a single unit with one drive a horizontal run of 85 ft and a 95 ft lift. The lift is made up of three sections, the first being at a steep angle, the second vertical and the third at a somewhat less steep slope 71 ft long, shown in Fig. 2. The horizontal section is underground in a tunnel extending from the railroad track hopper.

A 7½ hp motor, driving through a speed reducer, is sufficient to power the whole unit. The use of this very flexible elevator-conveyor made it possible to lay out the run to provide the most economical installation practicable. The need of only one drive also reduced the cost compared with other systems where there might have to be, as in this case, two horizontal runs with a vertical lift between, calling for three drives and additional equipment for delivering the material from one section to the next. Of course, maintenance is also simplified by having just the one drive.

However, the zipper conveyor-elevator has other important advantages which would call for its use in any event at the Oaks plant. In fact, it is the fourth which has been installed at B. F. Goodrich plants. The zipper conveyor-elevator is used to transport pelletized carbon black from the track hopper to the top of the overhead storage bin shown in Fig. 1. It can handle 9½ tons per hour at a speed of 200 fpm. Reversal of the belt is prevented by a roller type holdback on the headshaft.

The zipper is closed as it is filled at the track hopper and opened as close as possible to the discharge point. A revolving brush is located behind the head pulley where the conveyor is opened to provide for its complete discharge. The whole unit is totally enclosed in a steel housing for protection against the weather.

Since the pellets are sold in various sizes, and their size has a definite effect on the end product, it is important that degradation be avoided.

With the equipment formerly used there were numerous jammings which caused delays, and resulted in a bad situation from the standpoint of power consumption. A comparison of motor loading charts of the old and new conveyor systems showed a constant power curve for the latter, whereas the curves for motors driving the former equipment indicated frequent

surges, which had an adverse effect on the plant power factor and often involved undue stresses on the machinery. More motors were also necessary with the former system.

Degradation of the carbon black pellets was very satisfactorily eliminated by substituting the present equipment. Less dust and loss of material has been a noticeable advantage of the new equipment which also facilitates plant housekeeping.

At the other installation at the American Cyanamid plant in Bound Brook, New Jersey, the zipper conveyors are used to handle ammonium chloride, which is very corrosive to iron and steel. If any other type of conveyor were used much more steel work would be required and all steel parts coming in contact with the ammonium chloride would necessarily have to be made of stainless steel. This, of course, would be rather expensive.

Conveyor Eliminates Spillage

With the present zipper conveyor-elevator, the only places where the corrosive chemical can escape is at the loading and unloading points, where a small amount of stainless steel is required for the chutes and supporting rollers, thus greatly decreasing the first cost of the installation. The company hopes to cut its maintenance costs by preventing the escape of the corrosive material and eliminate possible spilling or dusting, which is liable to corrode steel at some distance away, where the corrosive action may be slow but rather costly over a period of time.

The zipper conveyor-elevator moves the ammonium chloride from the first floor level to storage bins on the third floor, Fig. 4. It is designed to handle 12 tons per hour. The ammonium chloride is fed to the conveyor at two points on a horizontal run 34 ft long. The conveyor then passes around a 90 degree bend with a radius of 6 ft, 6 in. to a 32 ft vertical rise and makes a similar bend to another horizontal run over the storage bins. This is illustrated in Fig. 3. There is a movable discharge mechanism which is moved by handwheel and cable over the entrance to the bin to be filled. The empty conveyor next passes around two small diameter pulleys for its return to the horizontal run on the first floor, shown in Fig. 3.

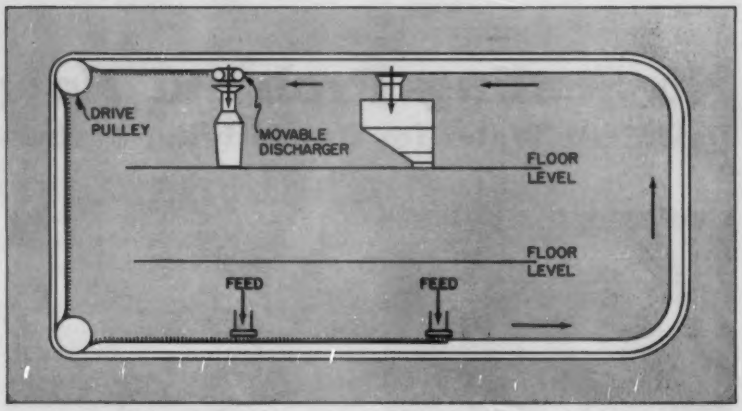


Fig. 3. Sketch illustrates how ammonium chloride moves from first to third floor

Details of the one drive that is needed are shown in Figures 4 and 5. Figure 4 shows the chain, also enclosed, from the speed reducer to the head driveshaft of the conveyor. Figure 5 shows the power transmission from the 2 hp motor to a speed reducer. The zipper is running flat at this point as it was opened for discharge of the ammonium chloride into one of the bins. It will not be closed again until it is loaded on the horizontal run on the first floor. This means that the drive pulley and the next pulley on the first floor, where 90 degree bends are made, can be of much smaller diameter than the other two pulleys around which the loaded and closed conveyor must make 90 degree bends.

Pneumatic rolls press on the open conveyor as it passes around the drive pulley, Figures 4 and 5, sufficiently to insure enough friction to drive it. A roller type holdback on the end of the drive shaft shown in Fig. 5 prevents reversal of the conveyor in case of power failure or other mishap.

These two examples of zipper belt conveyor installations give a good idea of the versatility of this type of mechanical handling equipment. They can handle almost any kind of loose bulk material over complicated runs involving curves and changes in level as a single unit, with one drive and without dusting, loss of material or damage to it.

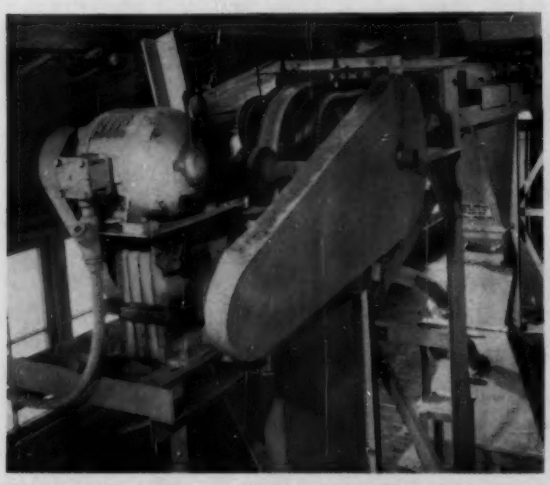


Fig. 4. Close-up view of drive mechanism for zipper conveyor belt at American Cyanamid plant, Bound Brook, N. J.

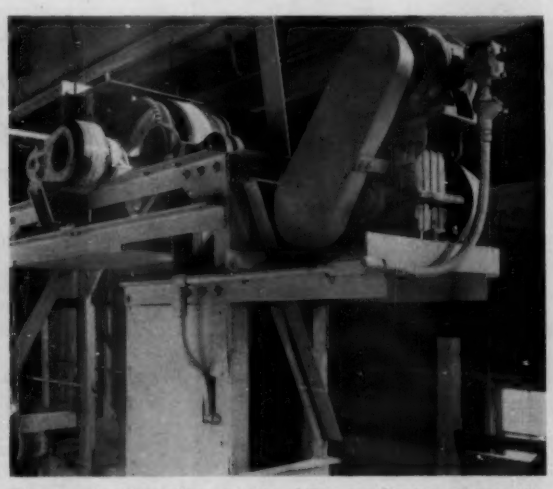


Fig. 5. Another view of the drive mechanism shows the power transmission from the 2 hp motor to the speed reducer

No Scaling Problem Now—

Deionized Water for Humidifying System is the Answer

Fig. 1. This is one of the curing chambers where coated abrasives are dried

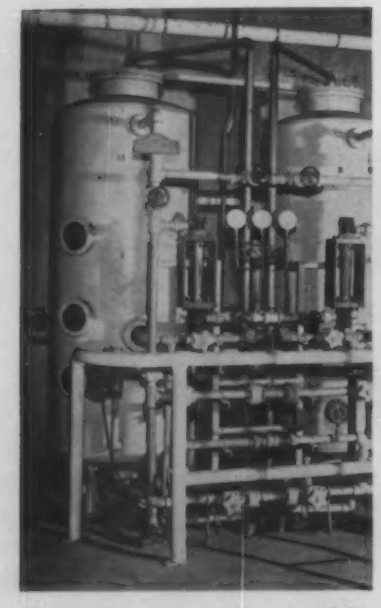


Fig. 2. One of the three pairs of deionization units, capacity 24,000 gal

UNTREATED WATER often is a source of continuing maintenance difficulty in humidifying systems. In many areas of the country, the water may look perfectly clear, yet contain dissolved solids which, because of the large make-up and high evaporation rate, rapidly produce scale in the equipment. The result is production losses and excessive maintenance costs.

To the Behr-Manning Division, Troy, N. Y., manufacturer of coated abrasive materials, scale formation in humidifiers was their main problem.

Maintenance Costs High

The final step in manufacturing coated abrasives is an oven cure at rigidly controlled time, temperature and humidity conditions, see Fig. 1. The humidifiers for these ovens frequently became inoperative or inefficient because of scale produced by the dissolved solids in the water supply. Maintenance costs were high and production scheduling was hampered by the frequent need to shut down the equipment for scale removal. This situation was solved by a deionization system which removes all dissolved solids from the water before it reaches the humidifiers.

Two types of humidifying systems are used in the plant. One, the open-pan type, in which hot, high-pressure water, 360 F, 250 psi, is circulated through tubing in the water pan. A stream of heated air is blown across the surface of the heated water and the resulting evaporation causes the air stream to become saturated.

A second type is the spray-type air washer. In this system, water at 180 F is sprayed through fine nozzles onto glass fiber filters. The heated air stream becomes saturated upon passing through the wet filters.

Behr-Manning is using 27 air-washer and pan-type evaporators, which require a total maximum make-up of 67 gpm under present operating conditions. Scaling was encountered in both types of washers. The problem was particularly acute with the air washers which are often used on an intermittent basis, as required by production schedules. After the equipment was operated for a number of cycles, scale deposited in the spray nozzles built up and the nozzle heads had to be dismantled and reamed out.

In the open-pan type washers, the major problem was the build-up of a thick scale on the heat exchanger tubes. This scale acts as an insulator which prevents good heat transfer, wastes fuel and reduces efficiency.

As the first step in correcting the situation, phosphate compounds were tried in an effort to complex the scale-producing minerals. Although this softening technique did alleviate the scaling problem in the open-pan washers, difficulty was still encountered with the spray-type air washers. As the residual water in the nozzles evaporated to dryness during the shut-down periods, the dissolved solids, including the phosphates, were left behind to plug the nozzle orifices.

Another causal factor was the steady enrichment of the solids content in the water by the continuous addition of treated water to make up for the loss through evaporation. Deionization was then tried.

This procedure has proved to be highly successful. All make-up water used in the 27 humidifiers is conditioned to practically zero dissolved solids in Monobed deionization units designed and installed by Hungerford & Terry Inc., Clayton, N. J. Because of scattered locations of the 27 humidifiers, three pairs of units, rather than a single large unit, were installed. Each unit contains a mixture of a high-capacity exchange resin and a strongly basic anion exchange resin, manufactured by Rohm & Haas Co. of Philadelphia. Each pair of units is designed to operate either in tandem or individually, and thus assures a continuous supply of the deionized water.

Deionization Units

The largest pair, Fig. 2, has a rated capacity of 12,000 gal of deionized water each; the second pair, 7000 gal each; the third pair, 3000 gal each. The rated output of the units is 5 gpm per square foot of bed. In the case of the largest unit, 36-in. diameter delivery rate is 34 gpm.

A conductivity meter is installed at the outlet of each unit as an aid in maintaining constant water quality. When the conductivity rises above the permissible level (about 2 micromhos), indicating excessive amount of dissolved solids, the unit is cut off stream and regenerated.

Industrial Instrument Maintenance

2-Organization of an Instrument Department

By TOM M. GAYLE, Consulting Engineer

Charts: Dow Chemical Company

ESSENTIAL OBJECTIVE of a plant instrument group is to guarantee that the company's investment in instruments and automatic controls is utilized for optimum plant operation. The purpose of an instrument department is to accomplish this objective with a minimum of human effort, at reasonable cost, in as expeditious and direct a manner as possible. The justification for such an organization is simply that higher efficiency and lower cost result from such specialization. The scope of the work may involve a dozen or more men, a single individual, or only the part time efforts of one technician. The benefits to be derived from the specialization on any level, however, have been repeatedly demonstrated in a number of industries.

It would be almost impossible to set forth in this article any detailed account of how to organize and efficiently operate an instrument department. Differences in plant size, operations, and needs preclude making this practical. It may be of benefit, however, to point out factors fundamental to any plant instrument organization.

General Functions

Maintenance and repair service is the principal concern of most plant instrument departments. The obvious tasks which fall in the category include inspecting, checking, calibrating, testing, cleaning, and lubricating. Emergency troubleshooting and repair service must be supplied as requested by the plant operating group. The prompt and thorough handling of emergency service is probably the most demanding task placed on the instrument section. The word emergency is used here to describe any situation which might threaten production although it is also applicable in the usual sense to describe any threat to plant safety. While planning for emergencies is at all times difficult, it should receive careful attention from the foreman or supervisor of the instrument group. If possible, every critical measuring and control instrument should receive thorough study with the idea of outlining certain procedures to follow in order to minimize the emergency and to keep the instrument "down time" as short as possible. All conceivable instrument failures should be planned for and precautionary steps established wherever practical.

Preventive Maintenance Program

The virtues of preventive maintenance have been mentioned in Part 1 of this article, and it is recognized that a sound preventive maintenance program carefully planned and faithfully carried out is the backbone of an instrument department. A well executed preventive maintenance program is an investment that pays enormous dividends. Many instrument groups have found that when preventive maintenance service is curtailed, a sharp increase in emergency calls invariably results.

The head of the instrument group will find it highly desirable to establish a definite daily, weekly, and monthly schedule of preventive maintenance items to be followed by the group. Recommendations of the manufacturers of instruments and control devices will be found to be of real value in this respect. Most manufacturers base their field service recommendations on actual operating experience compiled from numerous installations.

Each instrument must be weighed on its own merits. The accuracy of many plant meters will be found to be of little importance as long as the readings are reproduceable. Maintaining the high absolute accuracy of certain other plant meters, however, may require constant diligence. Flow meters, for instance, that are used for accounting purposes need frequent checking and inspection in order to assure flow accuracies within one per cent. The accuracy of temperature measurements used for heat treating or fractionating work must likewise be frequently checked. Some of the general recommendations for various classes of industrial instruments will be discussed in the concluding section of this article.

While maintenance is generally the principal concern of a plant instrument group, there are other responsibilities that can often be assumed by it to good advantage:

1. Revise and Improve Measurement and Control—As plant changes are made and as new instruments become available, the desirability of making changes will become evident. Replacement of obsolete and high maintenance units is also necessary.

2. Recommend New Applications—Inevitably, those connected with instrumentation will see operations in the plant that could benefit by automatic control.

3. Assist Production Department in Making Changes—Through some channel of communication, the personnel of the instrument department should be free to recommend process and operational changes to management. The instrument department is usually in an excellent position to recognize needed plant changes.

4. Develop New Instruments—Although the market seems abundant with instruments for every conceivable need, there are occasions when new methods should be developed. Methods pertinent to a particular operation, process, or plant are a valuable ad-

Fig. 1. Formal training courses are offered by several leading instrument companies. Bench work is an important phase

Photographs: Fischer & Porter Company

Fig. 2. These training programs also include a balanced program of classroom lectures, to supplement bench instruction

junct to commercially available equipment. If the plant has a research department, close cooperation between it and the instrument group often produces excellent results in this type of venture.

5. Testing and Evaluation—If the scope of plant operations is large and periodically involves large instrument investments, some form of test and evaluation program should be of value.

It is evident that most of these responsibilities involve personnel of engineering ability. If the plant manager deems these functions to be of sufficient value for his plant, he is compelled to find an experienced instrument engineer or train a younger engineer for these duties. It should be pointed out that even for pure maintenance, the analytical thinking of a trained engineer is often of sufficient value to justify his employ.

Organization

Regarding the position of the instrument group in the overall plant organization, it is necessary to deal in generalities, due to the wide variations in plant size, nature of operations, number of instruments, etc. In most plants the instrument organization is a division of the maintenance department.

Regardless of departmental association, the supervision of the instrument department must remain on as informal a basis as possible with all other groups. Proper departmental cooperation with the mechanical section and its crafts is necessary for smooth functioning, since instruments are generally involved in complex piping and wiring installed and maintained by other crafts.

In addition to the regular administrative duties, the instrument group supervision must be concerned with the assignment of highly specialized work, distribution of personnel, maintenance of safe practices, stocking of vital repair parts as well as charts and ink, and keeping instrument data files. The merits of establishing an individual instrument history file were mentioned in Part 1 of this article.

Personnel

Instrumentation is a young, fast moving, aggressive profession. It demands of its participants alertness, ingenuity, skill, common sense, and above all an analytical approach.

In general, the plant will be fortunate if it can obtain trained instrument mechanics and technicians. If the instrument department is to be a fairly large one, it is advisable to obtain at least a few experienced people around which to build the group. It should not be assumed, however, that the experienced instrument man will not require further training. First of all, the man must become entirely familiar with plant operations and processes before he can become of full value in troubleshooting. In some cases, a given plant's instruments are so specialized that considerable experience with a particular type of unit is necessary before proficiency results. In general, the whole field of instrumentation is moving so fast that almost constant training and study is necessary in order to remain abreast of the latest designs and techniques.

For the plant that has no alternative but to select likely prospects and to train them into qualified instrument men, let us examine some of the qualities that go to make up an instrument mechanic or technician.

The prospective instrument man should have good mechanical aptitude with more than a passing interest in things electronic. High school graduation or its equivalent is usually considered to be a minimum educational standard. Probably the one faculty which separates the good instrument man from the mediocre, is that of being able to analyze situations in a straightforward manner and to look beyond the obvious for cause and result. Such ability is a valuable asset in dealing with complex instrumentation. Any man selected for instrument work or training must show a genuine interest and enthusiasm for instrumentation. No amount of schooling can possibly make him a good technician if the basic interest is lagging. A good instrument man must have enough interest in his work to do some outside reading and he must possess enough curiosity to want to know "how it works." In this respect, it is often a mistake for a supervisor to think he can make an instrument man out of any available man.

Temperament Is Important

The temperament and personality of an instrument man frequently play as vital a part in his ultimate success as does his technical ability. Considering the cooperation necessary between the instrument department and other groups, the instrument man must be able to get along with many types of people. His attitude must remain friendly in many adverse situations. If one sustaining virtue could be associated with the outstanding instrument man, it would probably be that of patience. Instrument calibration and troubleshooting can, under certain circumstances, be thoroughly exasperating experiences.

What has been said here in brief, regarding the instrument mechanic and technician is true to an even greater degree of their foreman or supervisor. While the group leader must certainly have the usually accepted leadership qualities, his experience and technical proficiency must be outstanding. It is a mistake to have instrument mechanics and technicians

report directly to someone who lacks close personal knowledge of the field, regardless of his administrative talent.

Training

The type and scope of training offered to members of a plant instrument group is logically determined by the experience of the personnel, size of the department, and the availability of instructors. If the department employs over a dozen or so men, some type of regular training program should be carried out by the foreman, instrument engineer, or supervisor. It is usually desirable to divide classes into two or three groups, based on each individual's experience and prior training. Even the most experienced men in a department can benefit by regular semi-weekly or monthly sessions if they are geared to new topics.

Some of the most valuable aids to instrument training in recent years have come from the instrument companies. A number of the leading manufacturers now offer formal instrument training courses taught by qualified instructors. These courses are usually offered at the manufacturer's plant on a no charge basis, and they last from a week up to a month or longer. The programs reflect careful planning and are based on an optimum ratio of classroom lectures to actual shop maintenance and calibration work. Sending a key man or two to these schools is often an investment many times returned.

There are a great number of teaching aids that can be obtained from the instrument manufacturers, technical societies, state universities and institutions. Charts, texts, slides, and films covering a variety of instrument subjects are available.

Undoubtedly, the most effective long range training is accomplished by pairing off the untrained individual with an experienced technician. This practice will be readily recognized as the apprentice idea still utilized by the major crafts. While the practice is invaluable in the growing instrument group, certain aspects of the old idea are best minimized or eliminated. The entire relationship should be as informal as possible. The old idea of what may be called "servitude," for lack of a better description, is sometimes detrimental to both the company and individual. The type of individual best suited for instrument work is usually one who will be discontent if he has to do much "tool fetching."

The foreman should keep close watch over new or inexperienced men to be sure they are headed in the right direction. During the early stages of working in the plant or field, the trainee should be exposed to as great a variety of equipment as is practical. This will enable him to make the most of any classroom sessions or textbook reading he may acquire.

Photograph: Fischer & Porter Company

Fig. 3. While field testing of instruments is usually satisfactory, the use of a central well-equipped test room is of decided advantage in obtaining accuracy

Shop Facilities

While it is often necessary to repair instruments at the plant or field installation, it is desirable to bring them into a shop if at all practial. Adequate space and lighting together with the proper testing and calibrating equipment are unquestionably conducive to the best work from an instrument man.

In small plants the practice of setting up the instrument shop as a part of the electrical shop is sometimes followed. As long as the scope of the work is limited, this plan has definite merits. If the instrument group consists of more than two or three individuals, however, or if a fair portion of the plant instruments are pneumatic in nature, it is generally desirable to give the instrument group separate facilities. The psychological benefit of permitting the instrument section to have its own shop cannot be overlooked.

The nature of the instrument work to be done will point the way to what is required in the way of tools and equipment for the instrument shop. Unless a great amount of space is available, it is best to omit the heavier equipment in getting started. If need arises for large vises, heavy duty drill presses, grinders, pipe tools, etc., it is better to farm out portions of such work to other groups until the instrument section and facilities can expand to take care of the heavier work. Much of this work should probably remain in other groups but be under the final approval of the instrument department. Such items as overhauling large control valves, rebuilding large flowmeters, and cutting instrument panels usually fall in this category.

(Continued on page 172)

Photograph: Westinghouse Electric Corporation

Fig. 4. Consideration of the type of instruments to be serviced, and the manner in which the service is to be undertaken, dictates instrument repair shop layout

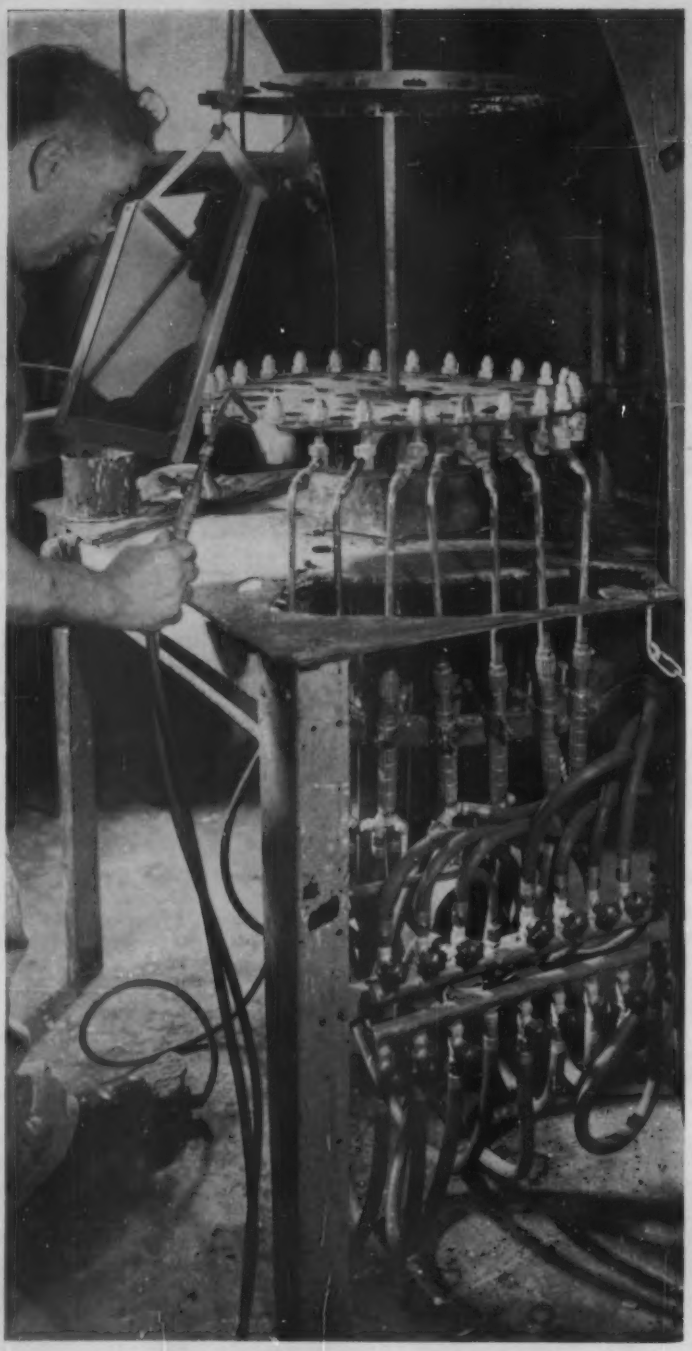


Fig. 1. Versatile mechanized brazing stations, such as this one, can be constructed inexpensively using hand torches, a multi-purpose work-holding table and a power drive. Here, a battery of seven torches bracketed in position, and fueled from oxygen and acetylene manifolds, preheats the heavy fittings before they reach operator who hand feeds silver alloy to make the joint. This arrangement saves operator's time and speeds production by heating the joint area up to nearly brazing temperature before parts reach operator. Foot switch indexes table as each joint is completed. Choice of positioning holes and holding clips on two-level work-holding table permits several types of assemblies to be brazed with same equipment. With preplaced alloy rings and an automatic timer on the indexing mechanism, this type of operation can be made semi-automatic

How to Apply

PLANT ENGINEERS are quite familiar with the combustion of oxygen and acetylene through the hand welding torch for manual silver alloy brazing operations. But all too few of them understand how to apply the combustion of these same gases to the modern production line—where automatic means of transporting and handling the assemblies to be brazed, and automatic means of applying the heat of the oxy-acetylene, oxy-gas or air-acetylene flame, are used.

Much can be accomplished in production set-ups with the torch tips, mixers, regulators, manifolds and cylinders so familiar in hand-torch brazing work if the production chief:

(1) Understands the various types of equipment both suitable and available for low temperature brazing work with the silver alloys,

(2) Knows how the flames should be directed at different kinds of parts and joints,

(3) Can determine proper heating time for the given joint with properly selected equipment, and

(4) Is able to calculate acetylene and oxygen requirements in preparation for specifying the control and fuel-supply part of the production management.

This article will treat such fundamentals, without discussing techniques of joint assembly, fluxing and work holding fixtures, or the machinery and mechanisms for transporting and manipulating the assemblies in the production cycle.

One of the great advantages of oxy-acetylene, air-acetylene and oxy-gas systems for production brazing is that a wide range of reliable burner and combustion-regulating equipment is available. Another is that only a small capital investment is required. Furnaces, motorized carburetors and electric induction systems require greater capital outlay.

In connection with the flame required, both single-flame tips, twin-flame units and multi-flame burners are available in wide variety. Single-flame tips are available in sizes from 72 to 20 (the numerical designations indicating the opening of the flame ports, in drill sizes). Tips may be of tapered one-piece swaged copper, or

Cylinder Gases on Brazing Lines

By A. F. CHOUINARD, Manager, Research and Development Department, National Cylinder Gas Company

consist of goosenecks onto which various tips may be screwed.

Table I gives the gas capacities in cubic feet of acetylene per hour for single-flame tips, along with the pressure-regulator adjustments for both the acetylene and the oxygen. These pressures are suitable whether the gases are supplied from cylinders or from plant pipe systems. Also given in this table are the approximate metal thicknesses that may be welded by each size of tip. This particular column is a guide in silver alloy brazing only in that it suggests relative speeds with which a given tip can heat a given mass of metal, and it should not be forgotten that welding temperatures are considerably above silver alloy brazing temperatures. For example, the flow temperatures for Handy & Harman's Easy-Flo and Sil-Fos are 1175 F and 1300 F respectively.

In using Table I to select tip size on the basis of required heat input, it is wise, and recommended, that a tip one or two sizes larger than indicated in the table is specified—and operated with a softer than usual flame. This will decrease gas velocity and simplify control without wasting fuel.

Single Flame Tips

For silver alloy brazing with single-flame tips, bushy or blunt flames are always used. The shape of an oxy-acetylene flame cone depends upon the smoothness of the bore, the ratio of the lead-in to the final-run diameter, and the sharpness of neck-down at the tip.

Gas mixers for oxy-acetylene combustion are highly perfected and precision engineered—and are either integral with the tip or matched thereto. Manufacturers' welding torch literature gives ample information on the range of tip sizes and types which are adaptable to a given mixer.

The Welding Handbook (page 143 of the third edition, shows how, in light torch duty, one mixer can handle a whole set of tips. It also shows that in medium torch duty, one mixer can handle part of the range of tip sizes (but several mixers are needed to cover the entire range). With heavy duty torches the mixer is generally matched precisely to each tip size.

Data presented here are based on use of the equal-pressure type of gas mixer, to which acetylene is supplied at pressures necessarily above 1 psig and up to 15 psig, and oxygen at pressures equal to or slightly higher than the corresponding acetylene pressures.

The drawings (Figs. 2a-2e) in connection with the data in Table II, show the twin-flame and multi-flame port patterns which are most popular in silver alloy brazing. Again, the tip size designation indicates the drill size of the port. Both acetylene and oxygen consumptions in cfh, and the delivery pressures at the cylinder regulators necessary for these flames, are also given.

Twin-flame tips are popular where it is desirable to bend the tubing carrying the brazing tips, so that the two flames play upon the joint being brazed from different directions or at different angles—as in sealing refrigeration and air conditioning systems. The proper gas mixers for such burners are always specified by the manufacturer supplying this equipment, as tips, mixers and torches are designed, and generally specified and purchased, as a unit. The required needle valves for oxygen and acetylene adjustment are an integral part of the torch handle. The usual gas hoses are used, of course, between the gas regulators on the cylinders and the torch units. Figure 1 shows a semi-automatic brazing setup of the rotary-table type built on such design principles.

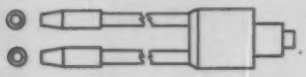
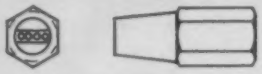
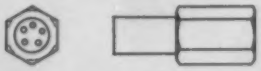
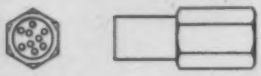
It may be, however, that the heat in the vicinity of the mixer-gooseneck-tip units (the burners) is such that needle valves and rubber hose should be located at some distance from the heat zone. In this case, welding torch manufacturers can supply adapter fit-

Table I. Gas capacities in cubic feet of acetylene per hour for single flame tip and pressure regulator adjustments for both acetylene and oxygen gases

Thickness of Plate to be Brazed* Inches	Tip Size	Average Delivery Pressure at the Cylinder Regulator		Consumption at Average Pressure	
		Acetylene	Oxygen	Acetylene	Oxygen
	drill size	psig	psig	cfh	cfh
28 ga to 5/64	62	4	5	11	11
5/64 to 1/8	58	5	6	14	14
1/8 to 3/16	55	5	6	20	20
3/16 to 5/16	50	7	8	30	30
5/16 to 7/16	42	9	10	60	60
7/16 to 3/4	36	10	12	87	87
3/4 to 1 up	31	12	14	113	113

*For relative heating power only. The "correct" tip size depends to a large extent on operator techniques—such as amount of flame motion and distance of flame from work—which affect the amount of heat actually delivered at the joint.

Table II. The drawings and the table show the twin-flame and multi-port patterns most popular in silver brazing

Tip Types Illustrated	Tip Type	Tip Size	Average Delivery Pressure at the Cylinder Regulator Acetylene	Oxygen	Consumption at Average Pressure Acetylene	Oxygen
		drill size	psig	psig	cfh	cfh
	Standard Twin Flame Unit	62	3	4	14	14
		58	4	5	18	18
		55	4	5	26	26
		53	5	6	32	32
		50	5	6	40	40
	(Fig. 2a)	46	6	7	56	56
	Three Orifices in Circle	62	4	5	16	16
		58	4	5	21	21
		55	5	6	31	31
		53	7	8	48	48
	(Fig. 2b)	50	8	9	60	60
	Four Orifices in Line	62	5	6-7	24	24
		58	5	6-7	31	31
		55	7	8-9	47	47
	(Fig. 2c)	53	9	10	64	64
	Five Orifices in Circle	68	5	6-7	20	20
		62	6	7-8	30	30
		58	6	7-8	37	37
		55	7	8-9	53	53
	(Fig. 2d)	53	10	12	80	80
	Nine Orifices in Two Circles (Standard)	72	5	6-7	25	25
		68	6	7-8	37	37
		62	8	9	63	63
		58	11	12	81	81
		56	12	14	125	125
	(Fig. 2e)	53	12	14	180	180

tings into which mixer-gooseneck-tip units will screw, and to which lengths of metal tubing can be brazed to run back to needle valves at panels in cooler and more accessible zones. In such instances stainless steel or yellow brass tubing should be used for the runs between adapter and valves.

Needle valves specifically designed for gas control should be used and should always be installed so that the valve stem screws into the inlet channel (the bonnet and packing always being on the outlet or downstream side).

Pressure regulation at the cylinders or at the station drops from the plant pipeline will follow general gas welding practice. Recent developments in this field which have produced regulators capable of maintaining constant flow irrespective of decreasing cylinder pressure, now provide the process engineer with superior gas regulation at very reasonable cost.

In much silver alloy brazing work, more use could be made of multi-flame tips because of their wider areas of heat distribution. Because of their high capacities they can also be used to advantage to throw lots of heat at heavy parts at critical times during the heating cycle.

For very light silver brazing work (as in automatic set-ups on delicate parts) some manufacturers offer torches and tips designed to handle and control volumes of gases smaller than shown in Table I, and acetylene consumptions as little as three-quarters of one cubic foot per hour. Note in Table III that such tips are also used with fuel gases other than acetylene, and volumetric consumptions of these gases are also given.

Where large amounts of heat are needed and it is desired to use propane as the fuel, torch manufacturers offer a special heating tip which fits standard goosenecks and mixers. It is of two-piece copper construction with drilled central orifices and radial outer slots for flame shaping, plus small rim slots for flame retention. Such tips are often recessed or cupped so that a skirt of metal rings the base of the flame at the ports. Such flames are excellent for silver alloy brazing work.

Acetylene-Air

Table IV gives sizing data on a new type of torch which uses acetylene as the fuel gas and aspirated air as the oxidant. A three-way control built into the valve of such torches permits independent adjustment of the operating flame without affecting the pilot flame. Each tip has an individual mixer integral with it. Where this tip is applicable (as in plumbing, refrigeration, electrical and general maintenance work) and where the required temperature is not high, the cost of oxygen can be eliminated. However, when oxygen isn't used heating time is increased so that the saving in oxygen is almost offset by the additional fuel used.

In applying the combustion of cylinder gases to low-temperature brazing, few early steps are more important than proper tip selection by test, and the determination of the proper direction of heat at the work. Before designing a production set-up and investing in mechanical drives and fixtures, careful laboratory experimentation with the heating cycle should be done. With such a wide and inexpensive variety of hand torches and tips, proper tip choice before designing the production set-up is simple.

All laboratory methods which work, however, are not suitable for production rigs. In mechanized production set-ups, the operator cannot move the flame about in the vicinity of the joint as he normally does in hand torch work. Therefore, it is generally wise to select tips which provide softer flames, and which uniformly heat the area to be brazed.

But selection of the tip is not enough. It is important to direct most of the heat at the heaviest part to be joined—seldom directly at the joint. The rule, as in all soldering and brazing, is to let the heat run from the heavy members to the light members, and let both parts to be joined

heat up first so that they in turn—not the flame—heat the brazing alloy to fusing temperature. This technique is in accord with that recommended by the engineering laboratory of Handy & Harman and other brazing alloy manufacturers.

In automatic set-ups, splash heat is often useful. In this case a piece of firebrick or a massive part of the fixture or assembly serves as a deflector to turn the flame and hot gases into those zones or corners where controlled heat is needed.

Only after bench experimentation has established: (1) the exact positioning of the flame with respect to the part, and (2) the exact time of heating required to produce perfect joints, can the combustion system be calculated. It is worth parenthetical observation that this same bench experimentation will fix other important determinants (fluxing, jigging, alloy placement, and joint design) which also influence the production set-up.

In doing the test work, watch particularly for overheating. With the oxy-acetylene flame, the danger of overheating lurks in the great advantage of its remarkable speed. Be sure to try multi-flame tips as well as single flame tips. Experiment with intermittent heating, imagining that each shot of heat, in a production set-up, occurs at a different station in a continuous or indexed production flow. The chief determining factor in the productivity of a production line set-up is the brevity of heating time at one station.

Fuel Supply System

If a perfect brazed joint can be accomplished with ten one-second jabs of heat, production will be greatly increased if you design a straight-line production set-up which spits out a finished assembly once every two seconds or 30 per minute.

Further, intermittent heating often provides: (1) the opportunity for a better spreading of heat by conduction throughout the assembly as it moves between stations, and (2) better control of the heat pattern by aiming the heat a little differently at each of several successive stations.

Knowing both the individual tip consumptions, and the heating time needed for a proper joint, the engineer can calculate the total acetylene and oxygen requirements (Tables I to IV) and specify appropriate manifolding and cylinder supply systems.

Standard acetylene cylinders contain 60, 100 or 275 cu ft of acetylene each, and must be manifolded so that the steady draw on any cylinder never exceeds one-seventh of its total capacity per hour. If usage is intermittent, one may occasionally exceed these rates of cylinder drainage, but gas usage is seldom intermittent in production brazing set-ups. Obviously, only the 275 cu ft size is manifolded.

When piped acetylene is used, it is necessary to have a hydraulic flash-back arrester and a relief valve on the cylinder manifold. Portable two-three- and four-cylinder manifolds have a dry type flash-back arrester incorporated into the pigtail connectors to the cylinders. Single cylinders do not require a flash-back arrester. Where there are many drops from a room or plant piping system, checks must be located at each drop. It is also desirable that each local area being fed from the main pipeline has its own station hydraulic flash arrester.

As regards the design of mechanized equipment for the transport of the assemblies to be brazed — from loading station to heating stations, through cooling stations to discharge station—table or conveyor motion can be either continuous or indexed. Motor-driven or pneumatically-driven circular turntables comprise an extremely popular approach to this problem. Straight-through and return loop systems are also quite practical.

Mechanical ingenuity will have broad range in devising machinery for silver alloy brazing using cylinder gases, but remember that you are dealing with heated members and parts which are fluxed with pastes of a corrosive nature. The engineer will want to make provisions to prevent these materials from getting into the bearings and onto the structures and moving apparatus. Further, he will want to use asbestos and other mineral boards rather than sheet metal around heating zones, and have them backed by frameworks of structural steel rather than by heavy plates which will warp if heated strongly on one side.

But it is also often desirable to have the human hand feed the silver brazing alloy into the joint in wire form, rather than rely upon a preplaced ring or cut length. One of the great benefits of cylinder gas application in silver alloy brazing is that it gives full opportunity for the operator to time properly the application of the brazing alloy to the joint as its temperature rises, and to control properly the rate of feeding of the alloy to the joint under heat.

Table III. Tip sizes for use with acetylene, natural gas, or hydrogen used as fuels

Tip Size	Fuel Gas Used	Average Regulator Pressures		Consumptions at Average Pressures	
		Fuel	Oxygen	Fuel	Oxygen
drill size		psig	psig	cfh	cfh
76	Using Acetylene	2	2	0.75	0.75
72		2	2	1.50	1.50
68		2	2	2.50	2.50
65		2	2	3.00	3.00
61		3	3	4.00	4.00
56		3	3	8.00	8.00
55		3	3	9.00	9.00
53		3	4	12.00	12.00
76	Using Natural Gas	2	2	0.50	1.25
72		2	3	1.00	2.50
65		2	3	2.00	5.00
60		3	4	3.50	8.50
55		3	4	7.00	17.50
45		4	5	15.00	37.50
38		5	6	22.00	55.00
65	Using Hydrogen	2	3	9.00	4.50
60		3	4	12.00	6.00
55		4	5	26.00	13.00
53		4	5	36.00	18.00

Table IV. Sizing data on new torch which uses acetylene and aspirated air

Tip No.	Tip Drill Size Inches	Acetylene Consumption at Indicated Gage Pressure					
		5 psig	6 psig	7 psig	8 psig	9 psig	10 psig
3	3/32		0.25	0.30	0.35	0.45	0.50
4	1/8	0.60	0.75	0.85	0.90	0.95	1.00
5	5/32	1.50	1.70	1.85	2.00	2.15	2.25
6	3/16	3.25	3.60	4.00	4.25	4.50	4.75
8	1/4	4.75	4.85	5.90	6.30	6.75	7.00
12	3/8	10.00	12.00	13.25	14.25	15.25	16.25

Plant engineers from the Chicago, Northern Illinois, Calumet Region and Milwaukee Plant Engineers' Societies attended the annual regional get-together. This year the Chicago Plant Engineers' Society was host

Speaker of the evening, Andrew W. Kramer, fourth from left, poses with officers of the four Plant Engineers' Societies that took part in this joint meeting. Mr. Kramer's talk was on Atomic Power for Industry

Activities of Plant Engineers' Societies

Chicago Host for Regional Meeting of Four Clubs

AS THE NUMBER of Plant Engineers' Societies increases so will their activities. Following is a brief report of what some of these Societies are doing:

New York

A tour of the Federal Telecommunication Research Laboratories was scheduled for the November meeting of the Plant Engineers' Association of Metropolitan New York.

W. O. Kind, plant engineer at the Research Laboratories, arranged for the tour which included the radar tower, vacuum tube laboratory, telephone laboratory, chemical laboratory and the physics laboratory.

Many of the members were interested in the ultra-modern fire protection and gas detecting installations.

Los Angeles

Members of the Plant Engineers' Society of Los Angeles took part in a panel session on the subject: Organization in the Plant Engineering Department.

The leader for this discussion was C. A. Gallaher, plant engineer, of Robertshaw Fulton Controls Co. The speakers were: W. H. Bayley, chief mechanic, Southern California Coop. Wind Tunnel; T. H. Hardgrove, superintendent of maintenance, Aerojet-General Corp.; and Wm. L. Daniel, manager of plant engineering, Hughes Aircraft Co.

This very interesting discussion was followed by an equally interesting question and answer period.

Kentuckiana

Officers who will take over the duties of the Kentuckiana Plant Engineers' Society for the coming year are:

P. Joseph Sehlinger, of American Air Filter, will be the new president; E. B. Worth, Philip Morris Co., Ltd., is the new vice president; and B. E. Head, Jr., P. Lorillard Co., sec.-treas.

Member-at-Large for a two-year term will be John Vonderheide of General Electric Co.

Regional Meeting

Members of the Plant Engineers' Society of Chicago were hosts to plant engineers from the Northern Illinois, Calumet Region and Milwaukee plant engineers' clubs who attended the annual regional get-together.

This is the fourth time these groups have held this joint meeting. The first one that started the ball rolling was held in Chicago; members of the Calumet region were hosts for the second affair; Northern Illinois had the third meeting; and now the Chicago group is beginning the second cycle of this annual get-together.

Speaker at this joint meeting was Andrew W. Kramer, Editor of *Power Engineering*, who spoke on the subject, "Atomic Power for Industry." After his talk, Mr. Kramer was kept quite busy for almost an hour answering questions on atomics.

Union-Middlesex

The Plant Engineers' Association of Union-Middlesex Counties, New Jersey, recently elected new officers to take over the Association's duties for the 1955-1956 season.

These officers are: I. R. Lewis, of Merck and Co., Inc., to serve as new president; S. Whitehead, American Cyanamid Co., Calco Chemical Div., will be the new program chairman; and J. F. Marken, General Motors Corp., B.O.P. Assembly Division, is the new secretary-treasurer.

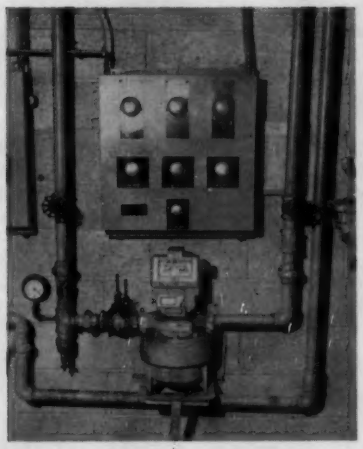


Fig. 1. This is typical of the control panel board and piping system used to dispense flammable solvents from outdoor storage tanks to the mixing vats

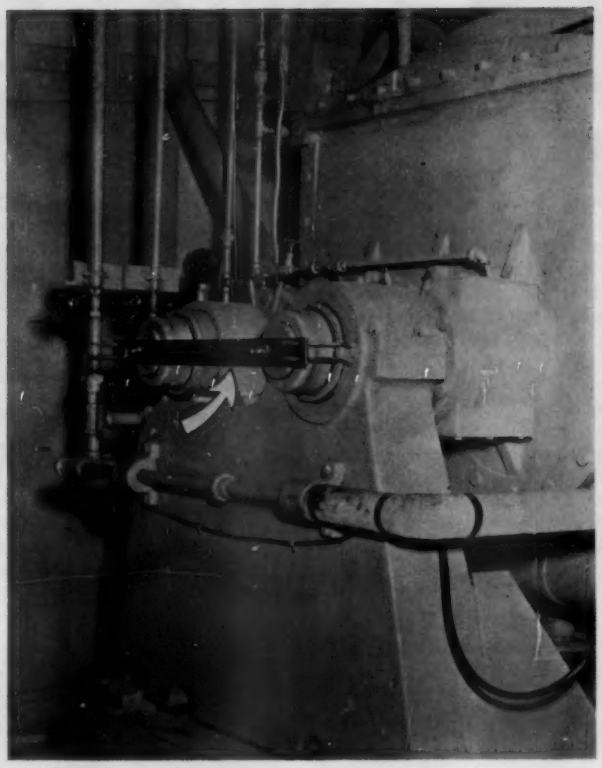


Fig. 2. Another safety measure is the company's own design for draining off static from mixers. Shafts are grounded by bronze pins under spring tension

Fires Can't Find a Place to Start

Because Hazardous Solvents are Closely Watched at Permacel

By CHARLES M. NEWMAN, Safety Department, Permacel Tape Corp.

ONE HAS ONLY to struggle through the inconvenience of even a small plant fire to become more than ordinarily conscious of good fire-safety methods. Upset production schedules, man-hours lost in makeshift bypassing of inoperative equipment, overloads on other sections of an affected department—these are but a few of the consequences of "minor" fires. The ruinous effects of big fires need no emphasis here; they are well and frequently dramatized in newspaper headlines.

A fire-safety program embraces considerably more than putting in the right kind of extinguishing equipment; it is equally concerned with fire prevention. Thus, it is not something to be bought, installed and forgotten. For the most part, it involves people—management, supervisors and workmen alike—and for that reason its success depends largely on the continuity of attention given it by all three groups.

Of course, in a plant like ours, fire and explosion hazards are greater, and hence require a higher degree of preventive care than in the average industrial plant. In the manufacture of acetate, cellophane, paper, cloth, and vinyl pressure-sensitive tapes, it is necessary to handle and store large quantities of highly flammable solvents and adhesives. Solvent spills and the accumulation of explosive vapors, therefore, are two of the most critical hazards that exist in our plant.

But similar conditions can readily exist in the storeroom or some other corner of a plant that makes a relatively fire-safe product. One gallon of solvent can be ignited just as easily as a tankful—and once this occurs, there is no guarantee that a small fire will not become a plant-destroying conflagration.

The majority of solvents, commonly used in our plant, have these four characteristics:

1. They have flash points at or below ordinary room temperature, which means that they are normally covered by a layer of flammable vapors which will ignite instantly in the presence of an ignition source.

2. They are explosive in the flammable range; whether or not an explosion results from the ignition of flammable vapors depends only upon the quantity of vapor in any specific area.

3. They have specific gravities less than 1.0, hence will float on water and thereby limit fire-fighting measures.

4. They have vapor densities greater than 1.0, which means that the flammable vapors are heavier than air and have a tendency to travel considerable distances at floor or ground level.

No Lost-Time Accidents

Although thousands of gallons of solvents with these characteristics are consumed monthly at the plant, there has not been a time-losing accident attributed to this cause in over two years and over 3½ million continuous man-hours have been worked without a single "lost time" accident from any cause.

Wherever solvents are handled or

flammable materials processed, static electricity is an ever present danger and a serious problem. It is generated not only by the friction of transferring large volumes of materials from one container to another, but also by the rotation of shafts and rolls.

The generation of static cannot be prevented, but it can be controlled. Static is not in itself a hazard. The danger stems from accumulations of static in areas where flammable liquids or materials are processed. Precautionary measures are taken to prevent this.

Every new piece of equipment is electrically bonded and grounded as a part of the installation procedure. All moving shafts of equipment handling flammable liquids are grounded by spring bronze brushes or specially designed pins held in place under spring tension. Static eliminator bars are also provided at critical points before, in, and at wind-up ends of the coating ovens, through which cloth or paper must pass during a final production step.

Eliminating Static

The coating ovens could become the site of dangerous vapor concentrations, unless properly controlled and supervised. This hazard, however, is kept under automatic control by a vapor detection system known as the Davis alarm.

Whenever the concentration in any oven exhaust stack reaches 45 per cent lower explosive limit, a warning alarm will be sounded and a pilot light on the alarm circuit panel board will be illuminated. Should the concentration reach 50 per cent lower explosive limit, the shutdown alarm will be sounded and the oven drives will shut off automatically.

An elaborate ventilating system is still a further safeguard against the possibility of explosion, and it, too, has ingenious automatic features that sound an alarm if a ventilator ceases to function. All low point ducts in this system, which number about 200, are checked and inspected weekly. Finally, to minimize the effects of an explosion, should it occur, the roofs and windows of all hazardous areas in the plant have been properly designed for explosion venting. This is accomplished through roof hatches and special window latches.

Handling "Red Label" Material

Handling of all "red label" materials in the plant is governed by strict regulations. The only permissible equipment for dispensing any such material in greater than one quart volume is safety cans, containers with fusible link covers, or through closed systems.

When waste "red label" material is to be disposed of, it must be poured into grounded "slop drums" equipped with fusible link covers. When drums are two-thirds full, these covers are replaced with regular drum lids which must be securely taped in position. The sealed containers are then removed from the work area. The rule of taped-on lids or covers applies to all containers once they have been opened.

Unless specifically authorized, no "red label" materials are ever used for clean-up of machines or equipment. The so-called "safety solvents" with high flash points or none at all are used extensively for cleaning the equipment.

Many other fire prevention regulations, typical with solvent handling plants, such as explosion-proof electrical equipment, spark-proof tools and the use of burning and welding permits, are, of course, standard practice at the plant.

Thus, by infinite precautions and elaborate mechanical devices, the company guards its ticklish operation against the twin risks of fire and explosion. But if the enemy should pierce these defenses, there are several counter defenses ready to go into action to prevent or minimize personal injury and property damage.

The first line of defense against fire is an automatic system with 100 per cent coverage and a full complement of strategically placed hand extinguishers, mainly of the CO_2 and dry powder types. There are also several automatic CO_2 systems installed for control of special hazards and adequate hose lines, with fog nozzles, placed strategically throughout the plant and around the outside of the building. All fire-fighting equipment is inspected weekly.

The plant's completely automatic and supervised fire alarm system is also considered invaluable in securing split second response and action. All alarms are coded to indicate the location of the box pulled or the area where a sprinkler has been activated. A special feature of the system is an impulse relay that closes down all coating equipment and backsize units the moment an alarm is actuated.

Finally, a trained fire brigade composed of 57 members are charged with evacuating personnel and controlling fire. In addition to regular drills, members of this unit have received extensive training from professional fire fighters. The company is in the area served by the North Brunswick, N. J., Fire Department, and a direct telephone line to the department has been installed to insure prompt and proper coverage.

In the sense that over the years an intelligent fire-safety program may account for an output that could not be achieved if operations were interrupted by a disastrous fire, such a program is viewed as a worthwhile production tool.

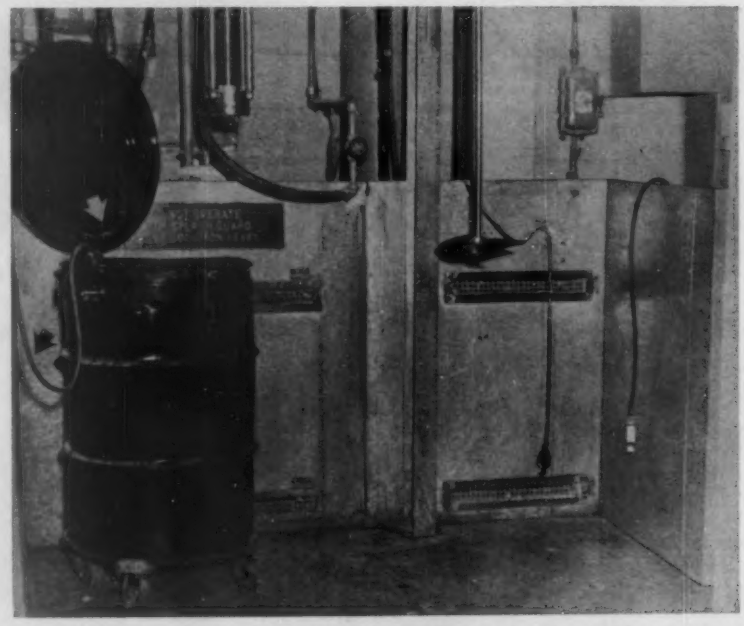


Fig. 3. Vented stall is used for disposal of flammable liquids in open containers. Note the fusible link on cover of drum and the flexible ground wire attachment

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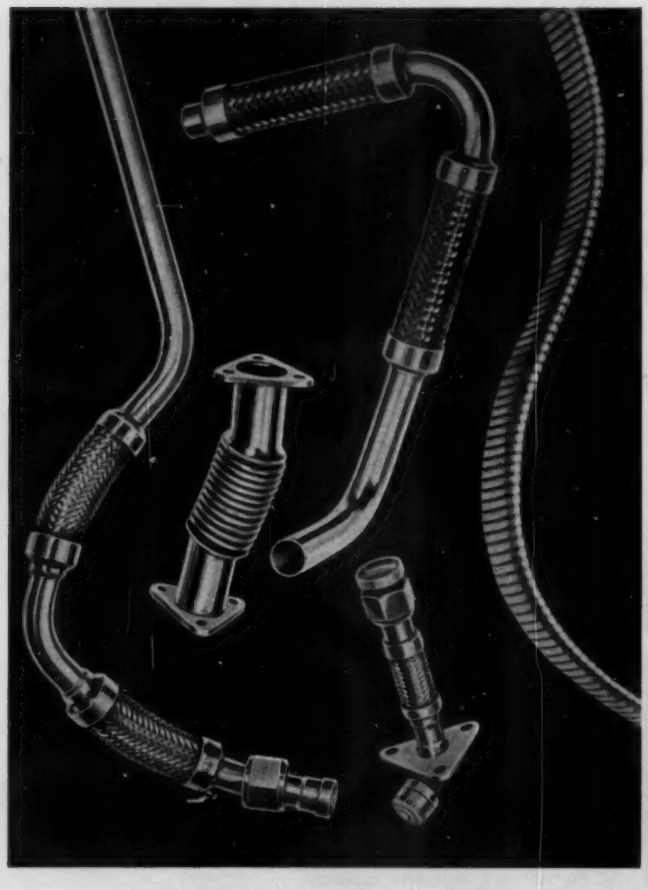

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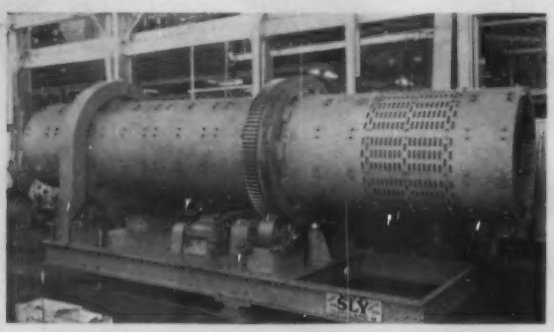
Malleable Iron Castings Cleaned Efficiently in Continuous Tumbling Mill

AT THE SAGINAW, MICHIGAN Malleable Plant of the Central Foundry Div., General Motors, the foundry is efficiently cleaning malleable iron castings and sprues in a continuous tumbling mill.



Forty-eight inches in diameter, and 21½ ft long, the mill cleans parts at the rate of ten tons per hour. The sprues and castings are fed into the mill by conveyor, are tumbled as they travel through the mill and are discharged at the other end. Maximum tumbling action is obtained by the specially-designed 10-sided manganese steel interior inset.

Tumbling time is 19 minutes, when the mill is loaded at 1/5 of its 54 cu ft capacity. When necessary, tumbling time can be increased by adjusting a retaining ring.

The outer shell of the mill is of double butt-welded ¾-in. rolled steel. It has a slotted section with hopper and dust hood for discharging sand and refuse. Driving through a speed reducer, a 20 hp motor provides power to operate the mill, which was built by W. W. Sly Manufacturing Co.

Rubber-Tired "Freighters" Use All-Wheel Drive to Cross Rugged Country

SEVERAL TYPES of giant cross-country freight trains are now being constructed by R. G. LeTourneau, Inc., Longview, Texas. The "freighters" differ considerably from the railroad variety, since they travel on huge rubber tires instead of rails, and especially because each car is self-propelled, rather than pulled by a single lead engine.

Every wheel of every car has an individual electric motor tucked into its center. Thus a six-car train, with six wheels per car, would have a 36-wheel drive.

Tires on some of the freighters range up to 10 ft in height and four feet in width, offering more than 50 times the ground contact area of an ordinary automobile tire. This size, plus the fact that the tires are inflated with as little as five pounds of air pressure, allows the freighters to travel through sand, snow or lowland areas where conventional equipment would bog down.

Another feature that adapts the trains to rough, rocky terrain is the flexible mounting of the axles, allowing the wheels to roll over obstacles such as stumps or ditches without transmitting jolts to the rest of the car.

The steering arrangement is unique in that it steers each car of the train in the tracks of the first, regardless of the number of cars being moved.

Modernizing with Light Helps to Convert Manufacturing Space into Offices

AT THE SHERATON Building, Boston, Massachusetts, a two million dollar remodeling job is converting the building from light manufacturing to office use. One recently completed relighting job, covering nearly 50,000 sq ft, offers an example of "modernizing with light." These areas, covering two floors of the building, were formerly printers' shops and have been reconverted into modern well-lit offices, now occupied by Dickie-Raymond Direct Mail Specialists.

Modern lighting techniques, using lighting fixtures designed by Sylvania Electric Products, Inc., have been relied on to convert dark areas into well-illuminated floors.

The transformation of two of the floors, the 11th and 12th, consists basically of the installation of acoustic ceilings with new lighting, windows and asphalt flooring. The lighting consists of Sylvania Trimline fixtures with close ceiling mounting canopies.

The close ceiling canopy mounting is an unusual feature of the lighting installation. Made of aluminum, the mounting saves valuable ceiling height, while taking advantage of the ceiling's reflective capacity.

PHYGON-XL is a low-cost and effective control for the most troublesome nuisance organisms in water—Algae.

Algae in an industrial water system can have far reaching effects on acidity, on outlets, inlets, filters and pipes in a distribution system. Use Phygon-XL to eliminate these troublesome factors. Added directly into the system at a rate of four pounds per million gallons of water, PHYGON-XL reduces over-all purification costs and the frequency of cleaning or back-washing filters.

Using PHYGON-XL to suppress blue-green algae blooms in lakes, ponds and reservoirs, also provides an opportunity for the vigorous growth of helpful aquatic plants. It can be mixed with water and applied as a spray over the area to be treated—about one half pound to one pound of Phygon-XL for blue-green algae, and five pounds for green algae per acre of water surface.

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For more facts circle 570 on Reply Card

Triple-Threat Clay Pipe Sewer System Handles Refinery Wastes

THE WASTE DISPOSAL SYSTEM at the recently completed $35 million General Petroleum Corporation's Mobilgas refinery at Ferndale, Washington, is a typical example of the complex systems necessary to carry the wastes of today's giant refineries.

Three separate waste disposal systems, using more than 60,000 ft of 4-in. to 24-in. vitrified clay pipe, were installed at the refinery. The resistance of clay sewer pipe to acids and chemicals made it a logical choice for the handling of the waste products at the refinery.

One of the three systems gathers all waste from laboratory and process areas, in addition to intermediate storage tank areas. The wastes in these lines are contaminated with phenol (carbolic acid), sulphur compounds, caustics, etc.

The second system, the oil waters sewer systems, collects all run-off water where there is a possibility of oil contamination from tank field sumps, process areas, pumping stations and water draw-offs from tanks.

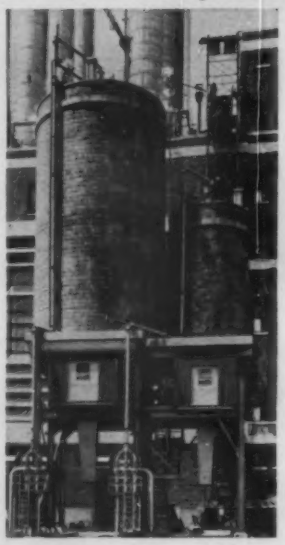
Third of the systems is the storm water disposal system, which carries the bulk of plant run-off water.

Softener and Fly Ash Facilities Completed as Initial Steps in River Rouge Modernization

INSTALLATION of the new flyash and bottom-ash handling systems at Ford Motor Company's Rouge Power House is complete.

In keeping with Ford's program to control smoke, fumes and dust in the Rouge plant area, mechanical dust collectors of aerodynamic-cone design are also being installed.

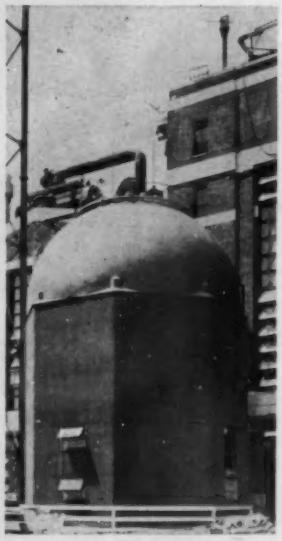
The new installation, which includes 600-ton flyash and 150-ton bottom-ash storage silos, was designed and constructed for the entire plant by the Kuljian Corporation, under the supervision of J. A. MacAlarney, Director, Plant Engineering Office, Ford Motor Company.



UNDER the same program, completion of a new 200,000 gph water-treatment system at Power House No. 1 has been announced.

The new system, reported as yielding virtually zero-hardness water, was designed, engineered and installed by Kuljian Corporation in collaboration with Ford engineers, also under the supervision of J. A. MacAlarney.

Equipment installed included a hot-lime softener (spheridome type), filters, hot-zeolite softeners, a 1,600,000-pounds-per-hour deaerating heater (thoroughfare type), and low pressure boiler feed pumps.



Oil Company Completes New Research and Pilot Plant Built "In the Round"

ONE OF THE MOST UNUSUAL scientific research buildings in the world, a $500,000 research pilot plant built around an unused oil storage tank, has been completed by the Continental Oil Company at Ponca City, Oklahoma.

Uniquely designed and constructed by Conoco's engineering department, the dismantled and reassembled 80,000-barrel tank is attractively faced with aluminum and porcelain enamel. It features windows, glass doors, a canopied main entrance and a separate entrance for trucks. Inside, the building has a circular open area, approximately 60 ft in diameter and extending from floor to ceiling, which serves as the pilot area.

A one-ton electric hoist hangs serves the pilot area, swinging in a 360-deg circle, thus facilitating movement of heavy equipment or supplies to any spot in the area.

Surrounding the pilot area are three floors of air-conditioned laboratories, offices, high-pressure cells, and utility and conference rooms—all built on the curve. These floors provide 33,000 sq ft of floor space.

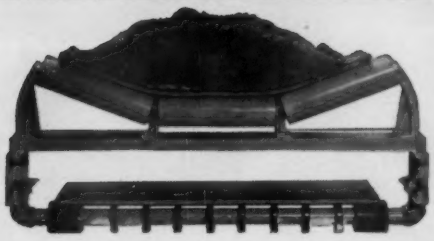
Today's simplest IDLER GREASE SEAL is also the best-performing

THE cartridge grease seal used on Link-Belt belt conveyor idlers provides the effectiveness of multiple sealing with the convenience of a single unit. A contact seal of laminated felt and neoprene combined with a labyrinth keeps dirt out, grease in. And the grease itself within the labyrinth further prevents entrance of dirt or other matter. What's more, no springs or loose washers are involved . . . there's no chance for metal-on-metal friction. The entire assembly comprises a rugged, compact "cartridge."

Simplicity is only one of the big advantages you get with Link-Belt idlers. Check the others below. For complete facts ask your nearby Link-Belt office or authorized stock-carrying distributor for a copy of Book 2416. It lists over 500 sizes in 34 types, including troughing, variable troughing, flat belt, belt training and rubber cushion idlers.

Sturdy, rigid frames support rolls in perfect alignment. Rolls are securely held in place but easily removed for inspection and service.

Grease seal cartridge assembles within the idler to protect the bearing.



You'll find these 6 features throughout industry's most comprehensive idler line

1. **HUSKY, HIGHEST QUALITY BEARINGS,** free and easy turning, assure maximum life, minimum belt-wear, low power consumption. Concentricity is secured by unit mounting of bearings in a heavy-wall center tube.
2. **SAFE, CONVENIENT GREASE FITTINGS** protected by flange ribs of support brackets provide ease of lubrication—lubrication for longer life.
3. **CONCENTRIC ROLLS** have smooth surfaces and rounded edges. Machine-made, continuous welds prevent entrance of dirt and moisture.
4. **HOP-FREE ROTATION** is assured by close tolerances, press fits and precision assembly from shaft to shell.
5. **STRONG, RIGID FRAMES** support rolls in perfect alignment. Rolls are securely held in place but can be easily removed for inspection and service.
6. **GROOVED HEX NUTS** lock into malleable brackets, creating bridge truss effect—prevent shaft rotation and bracket spreading under load.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,026

For more facts circle 571 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Huntsville, Ala. — The Norton Co., Worcester, Mass., has plans under way for the erection of a new plant for the manufacture of fused magnesia, fused zirconia, boron carbide and various other materials for the Atomic Energy Commission. The new plant, totalling 43,000 sq ft, will consist of three individual manufacturing areas with additional space of 4,000 sq ft for an office building adjoining. Cost of project estimated at $1,250,000. The Daniel Construction Co., Birmingham, Alabama, are general contractors.

Mobile, Ala.—International Paper Co., 220 East 42nd Street, New York 17, N. Y., has approved plans for the purchase of a second paper machine at local mill. Cost of expansion will total $38,000,000 when completed. First machine installation involving outlay of $20 million will be devoted to the manufacture of newsprint with a 100,000 ton annual capacity and the second with like capacity devoted to the production of unbleached kraft paper for wrapping paper and bags.

Antioch, Calif. — Crown Zellerbach Corp,. 343 Sansome, San Francisco, Calif., has plans maturing for the erection of a 170,000 sq ft paper bag plant at local site acquired for the purpose. Preliminary work is under way and construction is scheduled to begin in December, with completion in mid-1956 simultaneously with the completion of a kraft paper mill planned at the same site. It is estimated that plant will have a capacity of 54 million multi-wall bags annually. Cost of project to exceed $2 million.

Plaster City, Calif. — U. S. Gypsum Company, Chicago, Ill., has announced plans for a major expansion of company plant located here. Plant expansion is in addition to $30 million expansion announced earlier this year. Completion of facilities for full operation are expected to be completed in the spring of 1956. No cost announced, but is expected to represent an investment of over $1 million.

Porterville, Calif. — Rockwell Manufacturing Co., Pittsburgh, Pa., will soon begin construction of a 100,000 sq ft warehouse, assembly and repair plant at Porterville. The one-story concrete and tile structure will cost approximately $1 million and is expected to be completed by early 1956.

Van Nuys, Calif.—Chevrolet Division of General Motors Corp., General Motors Building, Detroit, Michigan, has authorized plans for the construction of plant addition at local assembly unit to increase body-building area by better than 30 per cent. The one-story addition, of steel and concrete, will add 93,750 sq ft of floor area and is expected to be finished by April, 1956. Cost of expansion is expected to exceed $1 million.

Kankakee, Ill.—A. O. Smith Corp., 3533 N. 27th Street, Milwaukee, Wis., steel products, has work under way on major expansion program at local plant at Kankakee, Ill. Main plant building will be modernized and improved, new steel silo will be erected in addition to the construction of three new storage warehouses including an office addition. Expansion will increase present capacity and production area by 50 per cent and is scheduled for completion in the fall of 1956. Cost reported to be in the neighborhood of $4.5 million.

Rockwood, Mich. — Hagan Corp., Pittsburgh, Pa., will build a chemical processing plant at Rockwood. The new plant will process and package various Calgon products used for conditioning water for household, commercial, industrial and municipal purposes. The plant, scheduled for completion in the fall of 1956, will represent an investment of $1 million.

St. Paul, Minn. — Theodore Hamm Brewing Co., 720 Payne Avenue, has authorized plans for company expansion at local plant. Addition of five story structure and basement will be erected to house a complete brewery. Production capacity will be increased to 2.5 million bbl annually an increase of approximately 10 per cent over 1954. No estimate of cost announced —reported to be a multi-million dollar expansion.

Bloomfield, N. J.—The Colgate-Palmolive Co., 85 Hudson Street, Jersey City, N. J., has announced plans for the construction of a new central research laboratory. The new laboratory will combine all of the company's basic and applied research and will employ over 400 when completed in 1957. Plant will represent an investment of between $5 and $8 million when completed.

Camden, N. J.—Campbell Soup Co., has awarded contract and work is under way on new 65,000 sq ft processing and shipping structure at local plant. A four-story structure will be erected to replace five older buildings torn down earlier in the year to make way for company modernization program. Modernization program at the Camden plant will continue for the next two or three years and will involve a total expenditure when completed in excess of $5 million.

Union, N. J.—The Schering Corp., Bloomfield Avenue and Broad Street, Bloomfield, N. J., manufacturers of pharmaceuticals, has announced plans for the construction of a new sterile products building. Main feature of 1½-story structure will be large operational area so designed as to guarantee sterility of production from raw material stage to finished product. Plant will cost in excess of $1 million and is scheduled for completion in 1956.

Cleveland, Ohio—Republic Steel Corp., has plans under way for a record expansion to boost ingot capacity of nation's third largest steel producer to 11,880,000 tons annually—an increase for company of 16 per cent. Expansion program will increase capacity of Republic's steel making plants in Cleveland to 732,000 tons; in Youngstown, Ohio, to 75,000 tons; in Warren, Ohio, to 330,000 tons; in Chicago, Ill., to 312,000 tons; and in Gadsden, Ala., to 168,000 tons. Expansion cost will be paid out of depreciation, amortization and earnings and is reported to be in excess of $130 million.

Macedonia, Ohio—Chrysler Corp., Detroit, Mich., plans to build a large metal stamping and fabricating plant on a 300-acre site midway between Cleveland and Akron, Ohio. This multi-million dollar plant will cover one-and-a-half million square feet and will be located one mile south of Macedonia, Ohio.

Warren, Ohio—Copperweld Steel Co., 39 Teifeld St., Glassport, Pa., has announced plans for a $12,000,000 dollar expansion program for the modernization of company's steel making and steel finishing facilities. Expansion will include $10,000,000 program at its Steel Division here, where seven electric furnaces will be improved and enlarged to a capacity of 660,000 tons of raw steel annually, from the present 618,000 tons. About $1 million will be expended at Wire and Cable Division at Glassport, Pa., and approximately $1 million at Seamless Tube Division, Shelby, Ohio.

Pittsburgh, Pa.—Pittsburgh Coke & Chemical Co., Grant Bldg., has authorized plans for the construction this fall of a new plant for the production of phtalic anhydride, a basic raw material for both the paint and plastics industries. The new plant will double company's capacity and is expected to be in full operation by fall of 1956. Located on Neville Island, just below Pittsburgh, the plant is estimated to cost in excess of $3 million.

Orange, Texas—Texas Portland Cement Company, Austin, Texas, has announced plans for the construction of a 1,500 bbl a day cement plant near Orange, Texas. Contracts have been let and work is under way on the construction of four cement silos, a slurry tank and a mixing tank. Plant will be ready for production late in 1956 and will represent investment of well over $3 million.

ease your hydraulic equipment maintenance problems with GULF HARMONY OIL

Use a hydraulic oil that has excellent resistance to oxidation, high film strength, outstanding rust preventive and anti-foam properties—qualities which hydraulic engineers consider to be the most important when selecting a hydraulic lubricant —and you will have fewer maintenance problems and less down time.

Gulf Harmony Oil has all of these qualities. It prevents the formation of sludge deposits and maintains its original viscosity over long periods of time. It also protects hydraulic equipment against excessive wear, even under severe conditions of pressure, speed, and temperature. And it protects against the damaging effects of harmful rust.

So if you have maintenance problems with your hydraulic equipment, call in a Gulf Sales Engineer. He will recommend the right grade of trouble-preventing Gulf Harmony Oil for your equipment. Contact him today at your nearest Gulf office.

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NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 181-182.

1—SEPARATOR MAGNETS toss out tramp iron

Discardo Cross-belt Magnetic Separators are designed to remove tramp iron and automatically discharge it away from the flow of material in a continuous operation. Suspended up to 4 in. above a conveyor belt, chute, or sorting table, the Alnico V permanent magnetic components of the separator create a magnetic field that pulls the tramp iron out of the material flow. Iron is attracted to the magnet face where a cleated endless belt automatically carries it out of the magnetic field to discharge it harmlessly. Frequent magnet inspection and hand cleaning are declared unnecessary. The unit is supplied assembled, including integrally mounted motor-reducer drive. Only electric power required is that for driving the fractional horsepower motor. Stearns Magnetic, Inc.

2—INSULATION for pipes and vessel, stands 1800 F

Kaylo-20, a hydrous calcium silicate product, has the advantage of expanding slightly up to 1100 F, it is announced; immersed in a test furnace, at 1800 F, shrinkage is limited to about 1½ per cent. Kaylo-20 is produced in a fingernail pink color to distinguish it from company's standard Kaylo, which is effective up to 1200 F. Besides its heat control properties this insulation offers other advantages. According to manufacturer, it is light in weight, has enduring strength, is insoluble in water, and when dry, regains its original thermal efficiency and strength without shrinking or warping. It may be cut or sawed. The pipe insulation comes in thicknesses and diameters for pipe sizes from ½ to 39 in. The block is made 36 in. long, in standard widths to 18 in., and thicknesses to 3 in. Owens-Illinois Glass Co.

3—PATCHING MATERIAL can be used on wet floors

Unusual resistance to oil, grease, acids, and alkalis, even blood, is claimed for 45 Patch, and it can be applied over wet floors. The material comes in powder form and is mixed with water at time of application. Due to quick setting powders used in the mixture, maximum setting time is 4 hr, says company, and floors can be put back into service within 24 hr. 45 Patch is said to form a permanent bond with existing floor area and to last as long as the floor itself. Other advantages announced for 45 Patch are: it can be painted over; it can be used inside or out; it won't chip or crack. Colonial Refining & Chemical Co.

4—SAW BLADES, carbide tipped, work in pairs

Claiming a finer finish with fewer teeth, Karbide-King Trim Side carbide-tipped saw blades are made especially for all operations where right and left hand blades are used in pairs for simultaneous cuttings in panel sizing, dimension trim work, double-end trim miter operations, or for any work where only one side of the cut is required to be smooth and chip-free. Blade design, due to fewer teeth, is said to result in a greater ease of operation, less operator fatigue and lower power consumption. The blades are made for both hand and power feed machines. DeLuxe Saw & Tool Co.

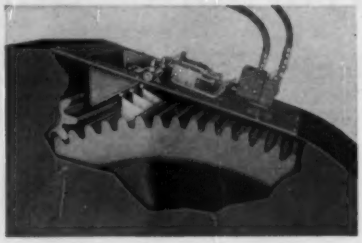
5—CHAIN COUPLINGS offer design advantage

Taper-Lock Chain Couplings are of a flexible type and permit sufficient relative movement between hubs to accommodate slight angular and parallel shaft misalignment. They are designed to provide a strong, yet compact, direct coupling of the shafts. Among features announced for these couplings are Taper-Lock bushings, readily available from distributors in desired sizes. They permit easy installation on full or normally undersized shafts, it is noted, yet give the equivalent of a shrunk-on fit.

The chain is double-width and conforms to ASA specifications—the additional bearing area of the full width permitting higher horsepower ratings and longer wear life, according to company. Quick disconnecting of the shafts is possible by removing one coupling pin and unwrapping the chain from the hubs. Two more teeth are furnished in each flange than are found in many couplings, a design feature claimed to contribute to long life and power transmitting capacity. Dodge Mfg. Corp.

6—SPRAY PANEL for lubricating gears directly

Spray Valve Panels are designed to spray-lubricate bull gears and girth gears such as on grinding mills and kilns, and other spur or herringbone gear trains. The self-contained panels are fastened



to gear housings or frame-work and spray lubricant directly to pressure side of gear teeth. Measuring approximately 2-by-3 ft, these panels feature stainless steel spray valves having built-in nozzles. Central pumping units deliver gear lubricant at regular intervals through a circuit of Dualine measuring valves. The measuring valves distribute lubricant under pressure to spray valves where it is mixed with air to form the spray. Bulletin 26-R gives data. The Farval Corp.

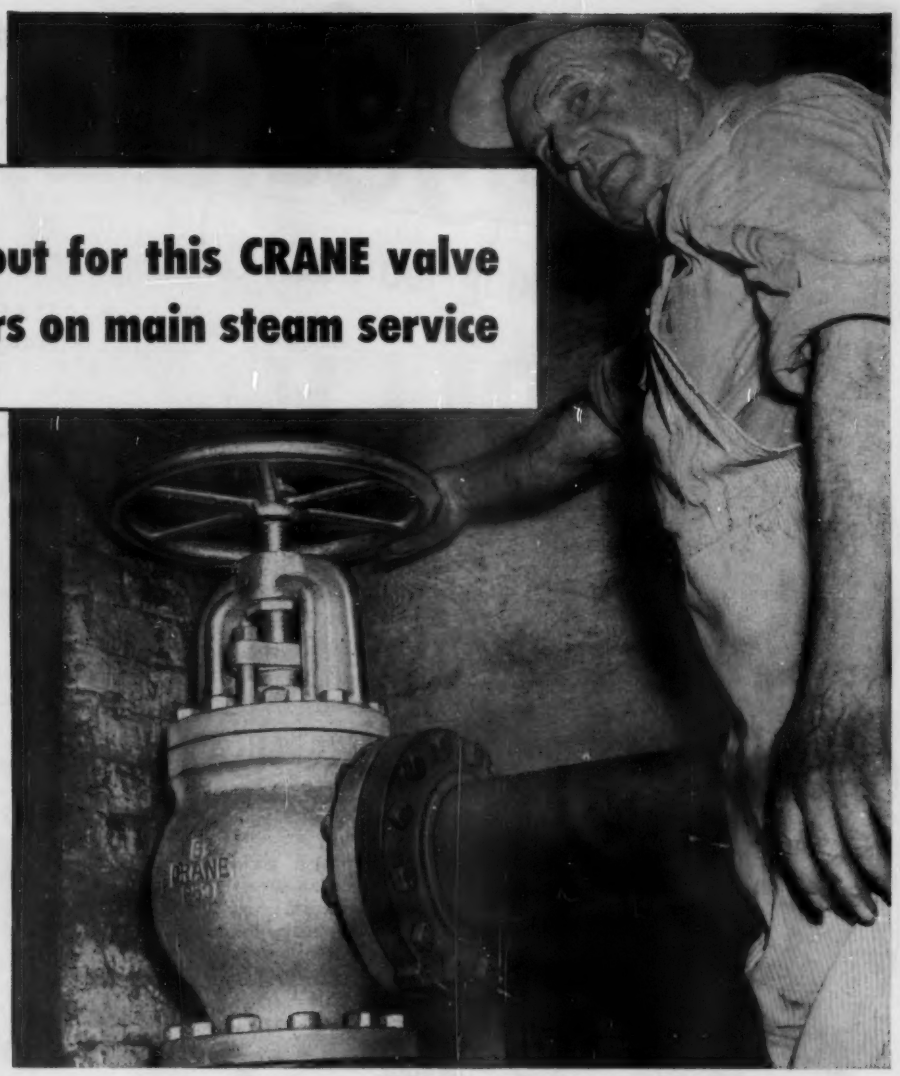
7—PARTITIONS, low cost, are permanent or movable

Unistrut Partitions feature the Atwood system of space division. The steel channel is combined with any standard paneling material—plywood, hardboard,

pressed wood, plastics, wallboards, metal, glass—from ⅛ to ½ in. in thickness. The partitions have sound-retarding qualities, and are reported to be strong and durable.

Flexibility in design and construction is provided. Manufacturer says any type framing pattern is available, including floor-to-ceiling, open ceiling, 7-ft office divider, cubicle, railing. The partitions are re-usable too. In erecting them, only simple tools and stock Unistrut parts are required. After laying out the area to

No time out for this CRANE valve in 40 years on main steam service



THE CASE HISTORY—Two Crane 250-pound iron body angle valves—6-inch (shown) and 5-inch size—scored this exceptional service record.

They were installed in 1915 on the main steam leads from boilers in the plant at Delavan, Wis., now occupied by The George W. Borg Corporation. In 40 years' uninterrupted service these Crane valves never failed to operate properly nor caused a shutdown. With but routine maintenance, they opened fully and were seated tight with ease under infrequent operation. Working pressure of boilers was originally 150 psi.—later reduced to 75 psi. This year, both valves were retired. The new replacements are Crane quality valves, of course.

Crane iron valves in particular need no introduction to thrifty buyers. In all grades, Crane iron castings generously exceed the requirements of equivalent A.S.T.M. specifications. Crane Ferrosteel, for instance, used in 250-pound valves is 35% stronger than ordinary cast iron.

In any pressure class, you'll find Crane quality outstanding. Choose from complete lines of gates, globes, angles and checks. Your Crane Representative can give valuable help in specifying and ordering.

Crane Co., General Offices, Chicago 5, Ill. Branches and Wholesalers serving all industrial areas.

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for the THRIFTY BUYER

VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

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Ruggedly Safe

—to do any jacking job better!

SIMPLEX JACKS

Re·Mo·Trol HYDRAULIC PULLERS

(PUMPS AND REMOTE CONTROLLED RAMS)
10 to 100 ton capacities

UNIQUE "CENTER-HOLE"* minimizes rigging and set-up—provides more effective power.

Simplifies tough pulling jobs! Pull rod or screw is drawn *through* ram plunger in straight, torque-free pull. Ram is own backup. Also lifts or presses.

*"Center-Hole" in rams of 30 ton and greater capacities.

RATCHET LOWERING JACKS

Lift or lower the load notch by notch. Cannot be tripped. *Toe has same capacity as cap!* High lift with minimum clearance means less set-up, less blocking. Single or double acting. 1½ to 20 ton capacities.

HYDRAULIC JACKS

Fast, easy power! Operate vertically or horizontally with same efficiency. Tested to 50% over rated capacity. Single or double pump models; 3 to 100 ton capacities.

SCREW JACKS

Cap floating on single chrome-moly ball reduces friction 88%. Forged cap corrugated for safety. Malleable iron base flared for stability. Four-way or ratchet heads. 10 to 24 ton capacities.

Other SIMPLEX JACKS include:

Simplex-Jenny Hydraulic Pullers
Push and Pull Jacks and Accessories
Reel or Drum Jacks
Trench Braces
Timber Braces

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LEVER · SCREW · HYDRAULIC
Jacks

TEMPLETON, KENLY & CO. 2561 Gardner Road, Broadview, Illinois

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 134)

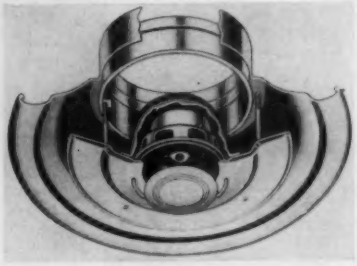
be partitioned, the channel is screwed to the floor and wall abutments. Upright channels are bolted into position, and horizontal channels bolted on. Then the panels are slipped into place and molding strips and corner plates added. Bulletin 900 gives data. Unistrut Products Co.

8—ATTACHMENT for ¼-in. electric drill

The 3-in-1 Saw is designed to turn any ¼-in. electric drill into a hack saw, a jig saw, or a coping saw. As such it is suited for cutting metal, wood, plastic, cardboard or plaster board. When used as a hack saw the tool is declared ideal for cutting light metals. Scroll and contour work can be done when the tool is used as a coping or jig saw. The tool has a set screw to lock the blade for safety. Up to 9/16 in. is provided for chip clearance, and a cam reduces saw speed to ½ of drill speed. Aladdin Mfg. Co.

9—AIR DIFFUSER also accommodates loud speaker

One ceiling opening suffices for both public address or piped music system and air delivery with this air diffuser designed to accommodate an 8-in. high



fidelity speaker. It is suggested for plant cafeterias, manufacturing and assembly areas, and similar spaces. By mounting speaker within air diffuser the sound source enjoys the same strategic ceiling location as the diffuser, to assure distribution of both air and sound. Air discharge does not distort sound quality, it is claimed, and capacity and performance of the diffuser are not affected by the addition of the speaker housing. The loud speaker-air diffuser comes in three neck sizes, 14, 16 and 18 in., with or without damper. Connor Engineering Corp.

10—WELDING HEAD offers quick electrode pressure

This electrode welding head is designed for hundreds of small part hand welding operations. According to company, good resistance welding is dependent on three factors: amount of electric current, duration of that current, and electrode pressure. The first two factors are resolved in the adjustment of power supplied to

CONTROL TEMPERATURE WEIGHT CA ITY RUGGEDNESS FLUID COST DEPENI ILITY METALS CORROSION PRECISION PRESSURE

What's Your Pressure Problem?

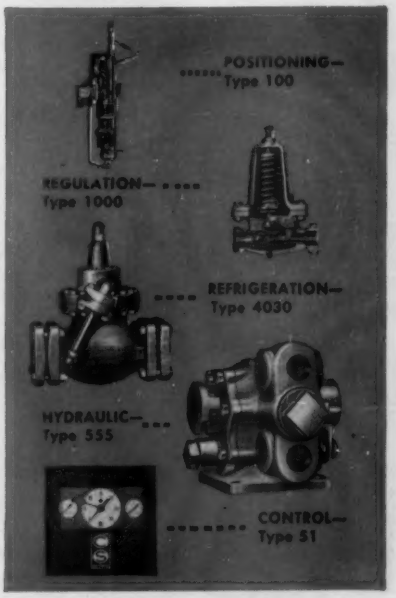
CS has a Better Answer

or will find one!

Finding or developing answers that *best suit* individual pressure problems has been Cash Standard's specialty for over a quarter of a century. The solution to *your* problem can be found either in the established Cash Standard line of pressure regulators, instruments and automatic controls, or in Cash Standard's willingness to tackle problems—to modify existing products or design new products to conform precisely to your needs.

For an individual solution to *your* pressure problem, contact the Cash Standard pressure specialist in your area, or write for pressure problem analysis.

Some Applications Served by Cash Standard Pressure Products



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Pressure, Hydraulic, Temperature, Process and Combustion Controls

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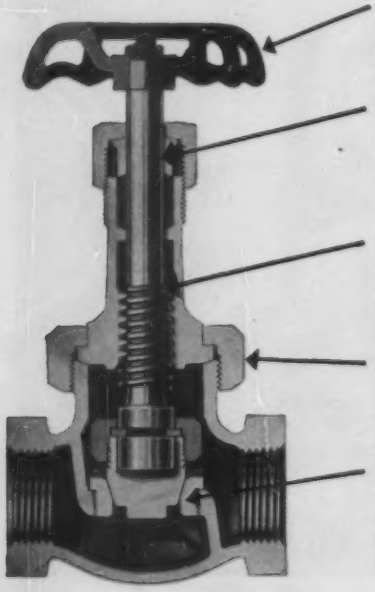
THE KENNEDY "500 BRINELL"

Bronze Globe and Angle Valves *with* Stainless Steel Seats and Discs

KENNEDY'S "500 Brinell" valves set a new quality standard in valve design, engineering and performance. New, rugged construction features cut your maintenance costs because KENNEDY'S "500 Brinell" valves give you longer service life on your toughest jobs. Specially-treated, super tough stainless steel seats and discs give you leakproof performance because they banish common valve enemies. Check these new built-in quality features and see why KENNEDY gives you the greatest valve value:

TWO DISC TYPES { FULLWAY, PLUG TYPE } TWO PRESSURE RATINGS { 200 lbs., 300 lbs. }

Fig. 138S	200 lbs.	Fullway	Globe	¼" to 2"
Fig. 139S	200 lbs.	Fullway	Angle	¼" to 2"
Fig. 138PS	200 lbs.	Plug Type	Globe	¼" to 2"
Fig. 139PS	200 lbs.	Plug Type	Angle	¼" to 2"
Fig. 544S	300 lbs.	Fullway	Globe	¼" to 3"
Fig. 546S	300 lbs.	Fullway	Angle	¼" to 3"
Fig. 544PS	300 lbs.	Plug Type	Globe	¼" to 3"
Fig. 546PS	300 lbs.	Plug Type	Angle	¼" to 3"



"PISTOL-GRIP" HANDWHEEL . . Fits your hand, gives you a firm, easy 3-way grip on top, sides and bottom! Full palm protection, too.

KENALLOY STEM . . . A new, exclusive KENNEDY stem material that eliminates stem failures because it removes the cause of failures.

ACME THREAD Eliminates feather-edge ends which, in ordinary valves, can break off and lock stem in the bonnet.

UNION BONNET . . . A stronger, tighter joint that easily withstands pressure and pipe wrench punishment.

STAINLESS STEEL SEATS, DISCS "500 Brinell" hardness eliminates cutting by foreign objects, pitting, erosion, corrosion and wire-drawing.

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THE KENNEDY VALVE MFG. CO. 1066 EAST WATER ST. ELMIRA, NEW YORK

VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE-WAREHOUSES IN NEW YORK, CHICAGO, SAN FRANCISCO • SALES REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 576 on Reply Card

NEW PRODUCTS

(Begins on page 134)

head; the third factor is of importance with regard to construction of the welding head. Electrode pressure should be continuously applied while metals are in a plastic state to obtain good amalgamation. Since metals are in a plastic state for only milliseconds, follow-thru pressure must be instantaneous to avoid cracked or granular welds. This welder is said to accomplish just that. It is adjustable micromatically and pressure is applied through a cam acting against deflection of a cantilever spring.

Operation is accomplished by depressing a foot pedal. Upper electrode in moving down and contacting pieces to be welded applies effort against elasticity of cantilever spring. Thus a constant pressure is maintained, it is explained. As the cam which supplies this motion reaches the dwell, welding control is initiated. Microswitch can also be set to make percussion welds. Power is applied by a capacitor discharge power pack. Federal Tool Engineering Co.

11—FOOT SWITCH works any way it's pushed

"Circumference actuated," this electrical foot switch is designed to make positive contact where you push it—on top, or

anywhere on its circumference. It can also be actuated with hand, elbow or knee. Claimed ideal for precise, involved, or dangerous manufacturing processes where it is necessary that the operator have both hands free, the switch operates on 110 v, 10 amp. It measures 3-3/16 in. in diameter, is 1¼ in. high. If desired, two switches may be placed in series. The Birtcher Corp.

12—SUB-SURFACE WASHER solves backwash problems

This backwash device is reported highly successful in demineralizers, zeolite softeners and filters experiencing excess fouling of beds. Many waters are not turbid enough to justify clarification, it is explained, yet they contain enough soluble solids to plug softeners and filters—and usual surface washing devices become inadequate. According to manufacturer of this sub-surface washer, physical fouling of ion exchange and filter beds can result from any of three causes: dense precipitates, sticky pre-

For more facts circle 577 on Reply Card →

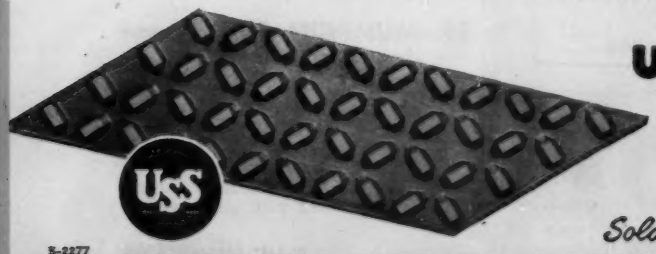
Case tractor platforms "safe-treaded" with Multigrip

Tractor drivers often find it necessary to stand while they maneuver. Loss of footing in such cases can result in serious injury to drivers or damage to equipment. To avoid accidents of this sort, J. I. Case Co., Racine, Wisc., uses USS Multigrip Floor Plate for foot platforms on *all* Case '400' Tractors. They know Multigrip's clean-edged, flat-topped risers give sure footing from all angles.

USS Multigrip Floor Plate is your safest bet *wherever* traction and sure footing are important. It's evenly spaced, "safe-tread" risers are real accident stoppers on steps, ramps, platforms and entire floor areas. Because Multigrip is made from tough steel, it won't chip, splinter or crack and can be formed for structural use. It is easy to clean, and it drains in *all* directions. Multigrip is available in large plates, reducing cost of installation. For safety's sake—always specify USS Multigrip Floor Plate.

Multigrip foot platforms make it safe for the driver to stand while driving any Case '400' tractor. Multigrip's evenly spaced, "safe-tread" risers assure safe footing even when wet or oily. Notice how the Multigrip plates have been bent to form a lip along the side of the foot platform.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



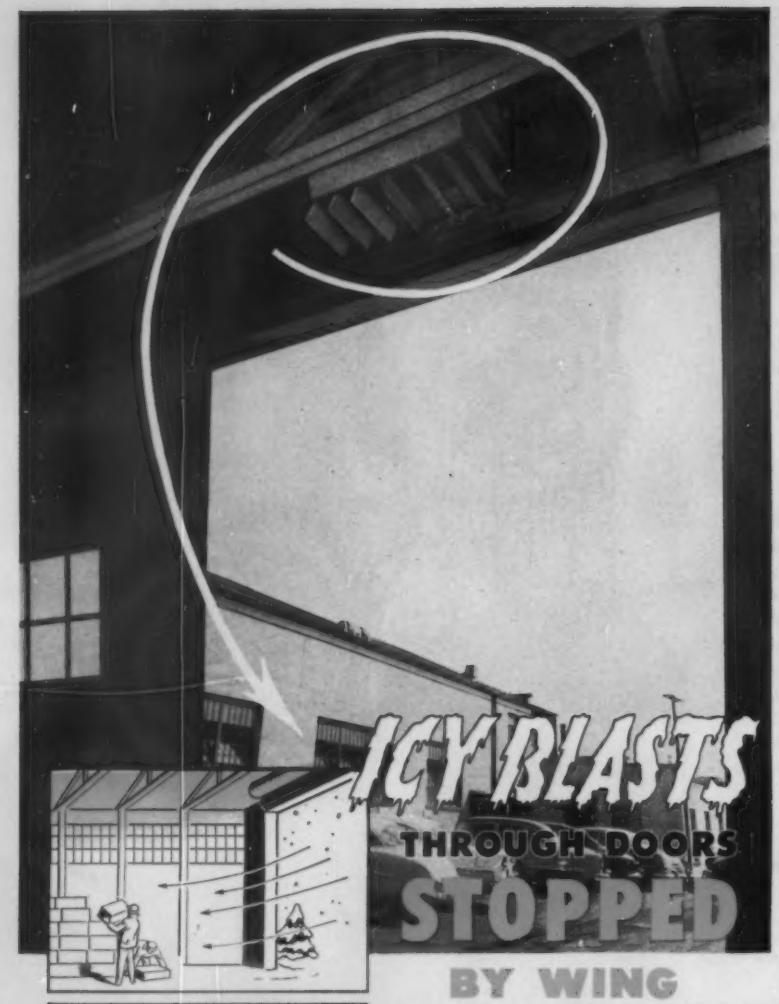
USS **multigrip**

FLOOR PLATE

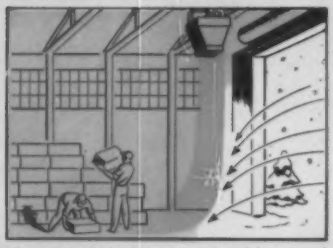
Sold by leading distributors from coast to coast

S-2277

UNITED STATES STEEL



BY WING DOOR HEATERS



A curtain of warm air is projected downward, preventing the icy blasts from entering.

They go into action as soon as the doors are opened, putting a curtain of warm air between the cold outside and the inside of the building, preventing the chilling blasts from entering. Workers stay healthy, are happier and keep right on working with the doors open. Learn how easily Wing Door Heaters can be installed in your plant. Send coupon for bulletin.

L. J. Wing Mfg. Co. 177 Vreeland Mills Road, Linden, N. J.

Factories: Linden, N.J. & Montreal, Can.
In Europe: WANSON, Haren-Nord, Brussels, Belgium

L. J. Wing Mfg. Co., Linden, N. J. PE-12
Please send me bulletin on WING DOOR HEATERS
Name.....
Firm.....
Address.....
City.....Zone...State.....

Wing

For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 134)

cipitates, and fibrous materials. In all three cases channeling and short circuiting result in the beds unless the obstructing solids are broken up and removed. Attempts to accomplish this by using excess backwash rates causes loss of ion exchange material as well, it is noted. But the sub-surface washer is claimed successful in breaking up these solids, preventing bed fouling and permitting effective backwashing at normal rates. Graver Water Conditioning Co.

13—COMPOUND keeps steam cleaners free of lime

Pena-Solv, a liquid solvent, acts to keep steam cleaners free of lime deposits by holding lime in suspension, so that it does not clog the coils. According to manufacturer, Pena-Solv is non-toxic and non-irritating and may be used in an enclosed area without fear of hazardous effects. The solvent is also claimed to soften hard water and remove soluble accumulations from all surfaces. Available in 55-, 30-, 15- and 5-gal containers, Pena-Solv is diluted with water for use. C-Z Chemical Co.

14—STEEL VALVE is quick-opening type

Designed for the general industrial use, this quick opening valve is announced for service at 600 psi at 800 F and 1200

psi at 100 F. Valve is recommended for use on steam, hot water, air, and gases. Streamlined design of valve permits maximum flow, company points out, and construction assures fast, positive openings and closures at pressures to 1200 W.O.G. Available sizes on request. The Klinger Corp. of America.

15—ALUMINUM SOLDER and dry bearing metal

Recently announced is a combination low melting temperature fluxless aluminum solder or welding rod which is also a dry bearing metal requiring no lubrication or coolant in frictional or chafing applications. It is derived from a blend of 87 per cent zinc with aluminum, tin

Like Easy Fishing?

GET NE Sherarduct
RIGID STEEL CONDUIT

Easy fishing . . . that's one reason contractors like Sherarduct rigid steel conduit. In addition to a smooth inside surface, Sherarduct's accurately cut threads let conduit ends butt inside the coupling . . . eliminate gaps that interfere with easy fishing.

Sherarduct has other plus features as well: The Sherardizing process of galvanizing that alloys zinc with the conduit wall, (plus a baked-on Sher-enamel coating) fortifies Sherarduct against rust and corrosion for life. All surfaces, including the hill and valley of every thread, are securely protected against corrosion.

Finally, the gradual heating and cooling of the Sherardizing process normalizes the metal in an annealing like process. Result: easier working, forming and bending on the job.

Write for a free copy of our new Sherarduct facts book. You'll see why the Sherardizing principle makes Sherarduct "galvanized conduit at its best."

Listed by Underwriters' Laboratories, Inc.

LIFE-TIME CORROSION PROTECTION
•
EASY FISHING
•
ZINC PROTECTED THREADS
•
STRONG COUPLINGS
•
THOROUGH GROUNDING
•
EASY BENDING

Sherardizing is galvanizing at its best . . . Sherarduct is galvanized conduit at its best

50TH ANNIVERSARY

National Electric Products

PITTSBURGH, PA.

3 Plants • 10 Warehouses • 36 Sales Offices

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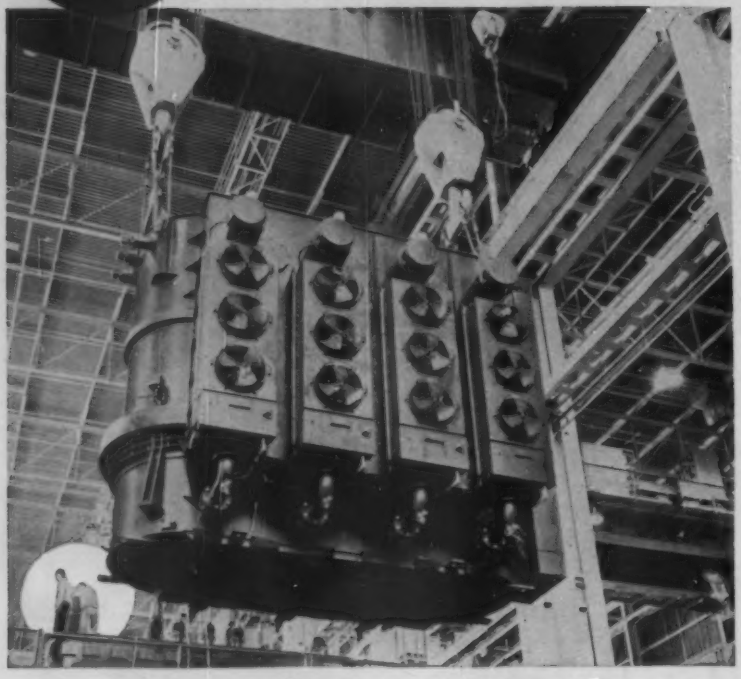
ACCO products

ACCO Registered* Wire Rope Slings

THE STANDARD OF EFFICIENCY AND SAFETY



You Can't Afford Not to Use Them!

● Materials handling is ticklish business. A dropped load can mean disastrous financial losses through ruined material and equipment, plus disrupted production schedules.

That's why more and more manufacturers are standardizing on ACCO *Registered* wire rope slings for all lifting operations. For ACCO *Registered* slings incorporate extra safeguards which make them the safest slings available.

Each individual component, made from the highest quality material suited to its use, is tested before assembly—must prove to have strength equal to or greater than the sling body. These components are then assembled into slings according to precisely engineered designs which have proven their safety and reliability in extensive field tests.

Each completed sling is then proof-tested at twice the load-carrying capacity for which it is rated. Then and only then does it receive the coveted registration certificate and tag.

Compare this rigorous quality control, precise design and manufacture, and extensive testing with the necessarily hit-or-miss methods used in producing "home-made" or hand-assembled slings. You'll see why ACCO *Registered* wire rope slings are safer.

And ACCO *Registered* slings cost less to use. Carefully engineered and precisely manufactured, they last longer, reduce overall lifting costs.

Get the details on ACCO *Registered* wire rope slings from your distributor, or call the nearest ACCO district branch below.

FREE SLING NOTEBOOK
Fifty-six page booklet includes data on sling use, tips on sling care, rated capacity information on all types of wire rope slings. *Write today for your copy.*

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ACCO

TRADE MARK

Wire Rope Sling Department
AMERICAN CHAIN & CABLE

Better Value

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 134)

and lead, cleansed and homogenized with muriatic acid at a foundry temperature of 1500 F. The metal melts at 600F, or at less than half of the disintegrating temperature of aluminum, says company, permitting use of the simplest torch equipment and a minimum of skill. The low working temperature also permits use with even thin gages of aluminum including all known aluminum alloys.

Pieces of this solder rod placed in rotating and stationary chucks of a lathe will withstand extreme friction noiselessly and heatlessly, it is claimed. Tests are reported to show it has withstood 20 per cent salt spray. It may be used to solder or weld. Welding requires only heat prolongation, rather than intensification, to cause fusion with parent metal. Chemalloy-Electronics, Inc.

Use the Reader Service Cards provided on pages 181-182 to ask for more information on these products. Circle item numbers of products in which you are interested.

16—CRAYON combines permanence, removability

Permapex is said to enable graphs, charts and diagrams to remain on most surfaces indefinitely. Fluctuating figures on other elements may be drawn in with chalk and washed off without damage to the basic chart. When the project is completed, the crayon markings can be removed with a solvent provided by the manufacturer. The Permapex Kit consists of four crayons—red, white, yellow and blue—plus a large tube of Apex-Removo, the solvent. Kit costs about $3.25. Apex Permanent Crayon Co.

17—POWER PIPE SAW is large capacity tool

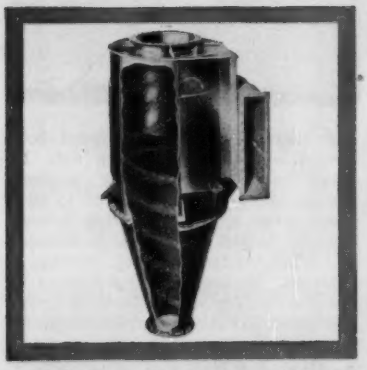
Big Guillotine cuts cast iron on steel pipe up to 16-in. diam on the job in minutes, it is claimed. This saw is designed to cut 10-, 12-, 14- and 16-in. cast iron and steel pipe in a space only 32 in. wide. A double chain pipe vise clamps the saw to pipe. Machine cast steel V saddle base serves to assure a square cut at right angle to pipe. And the pipe acts as machine tool base. The Big Guillotine is a companion to manufacturer's Regular Guillotine for cutting 2- to 8-in. cast iron and steel pipe and bar stock. The E. H. Wachs Co.

18—15-HP GENERATOR is balanced feed unit

Adaptation of balanced feed to this 15 hp unit is claimed to be the first successful application to a steam generator of

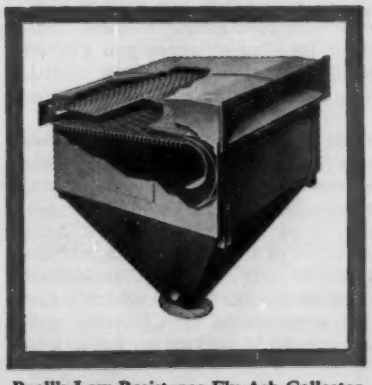
Electrode Breakage is no problem in Buell "SF" Electric Precipitators

SPIRALECTRODE
gives maximum continuous emission without weight... Minimizes breakage.
ORDINARY ELECTRODE
weighted to maintain center position between plates... No "give."



Buell Cyclones offer two "extra-efficiency" advantages: (1) exclusive shave-off which harnesses double-eddy and puts it to work, and (2), large diameter design which eliminates clogging.

Besides eliminating efficiency drops and "shutdowns" due to electrode breakage, Buell's unique Spiralectrode permits higher and more constant emission, extra efficiency. Also, Continuous Cycle Rapping—another Buell exclusive—keeps electrodes constantly clean for maximum performance!



Buell's Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for natural or forced draft installations. Ideal for boilers from 100 to 2000 BHP.

For more specific data about Buell's *extra efficiency*, write Dept. 14-L, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell

MECHANICAL ELECTRICAL

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

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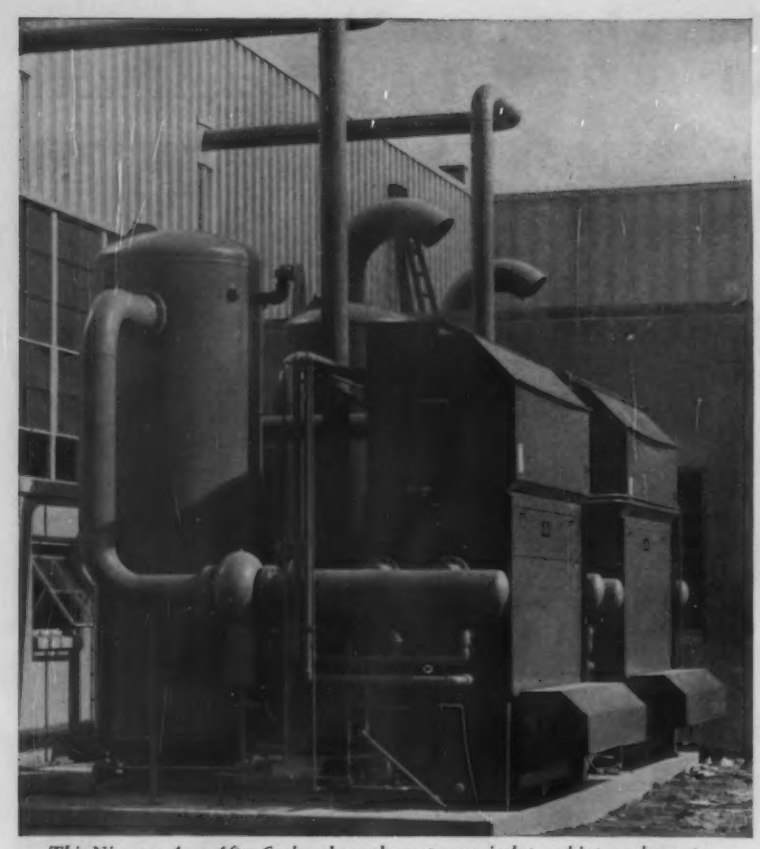


This Niagara Aero After Cooler also cools compressor jacket and intercooler water.

COMPRESSED AIR... Lower in Cost Dependably Drier and Cooler Trustworthy for Instrument Use

THE NIAGARA *AERO* AFTER COOLER offers a completely self-contained method replacing both shell-and-tube cooler and cooling tower. It is independent of a large supply of cooling water and consistently reduces compressed air temperatures to below ambient. Its drier air gives you a better operation and lower costs in the use of all air-operated automatic instruments, tools and machines, paint spraying, sand blasting and moisture-free air cleaning.

Direct saving in the cost of cooling water saves the price of the Niagara *Aero* After Cooler in less than two years. Water saving also means less expense for piping, pumping, water treatment and water disposal, or you get the use of water elsewhere in your plant where it may be badly needed.

Niagara *Aero* After Cooler assures all these benefits because it cools compressed air or gas below the temperature of the surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air thru a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter, proven in service on the largest plant utility air systems.

Write for complete information; ask for Bulletin No. 130

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. PE, 405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities

For more facts circle 582 on Reply Card

NEW PRODUCTS

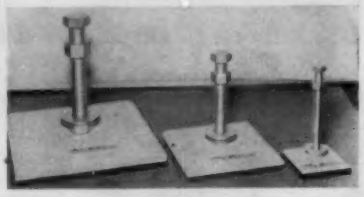
(Begins on page 134)

the automatic, forced circulation type. Balanced feed means that as the generator is operating, cold water entering the system from the supply source is never admitted directly to the coils. Instead, as steam is taken off and the hot water in the accumulator drops to a fixed level, an automatic control admits unheated feedwater into the accumulator. The temperature of the feedwater is abruptly increased. At the same time the feedwater is subjected to thermal shock, which encourages precipitation of solids. Thus, it is explained, water entering the coils is pre-heated and simultaneously freed of much of its mineral content.

This generator also has an automatic blow-down feature. It is suggested for use where low cost steam in smaller volume is required. Thermostatically controlled, it is designed to produce steam as steam is used. Four models are available. Clayton Mfg. Co.

19—VIBRATION MOUNT is double-function unit

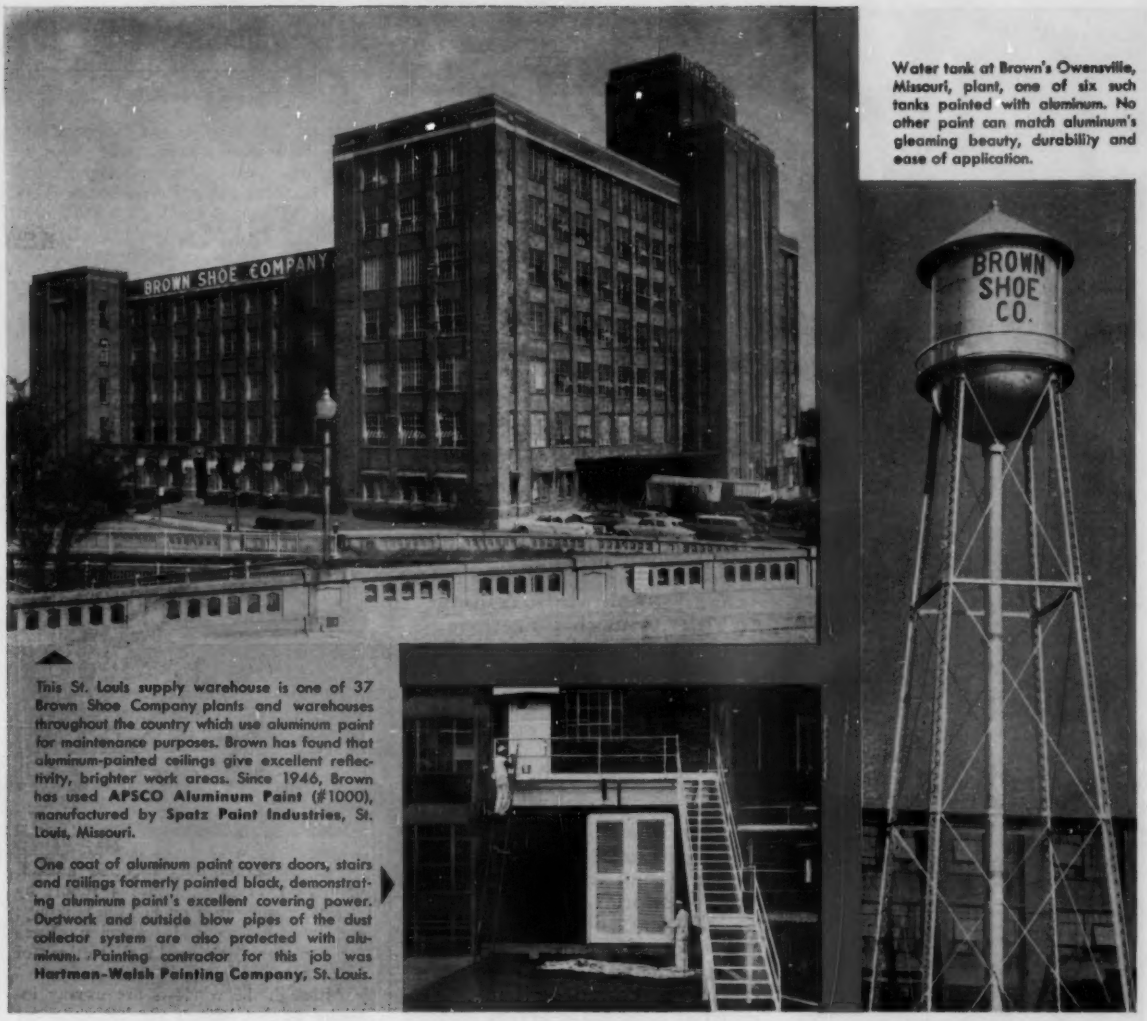
This machinery mount is designed to permit quick and easy leveling without lagging to the floor and reduce transmismission of machine noise, shock and vibration. The mount is low cost, company points out, and quickly installed. It consists of a metal plate with an Isomode



Pad cemented to it, a threaded bolt, flanged leveling nut and lock nut. To install on machinery already in place, footings are raised high enough to slide mount under it, bolt is inserted through foot and flanged leveling nut is threaded on. When machine is level, lock-nut is tightened. Because of characteristics of pad, the machine will not walk or creep, it is claimed. Fabricated from Neoprene, the pad is highly resistant to attack by oil, grease and floor washing compounds. Mount is available in six models of three sizes (3 by 3 in., 6 by 6 in., and 9 by 9 in.) with two types of Isomode Pad, depending on loading. Permissible load ranges extend from 100 lb to 12,000 lb per mount. MB Mfg. Co., Div. of Textron-American, Inc.

20—CONVEYOR BELT resists oil penetration

Featuring greater resistance to the penetration of vegetable and animal oils and fats, this conveyor belt, with a nitrile synthetic rubber cover, is designed for use in food processing plants, feed mills



Water tank at Brown's Owensville, Missouri, plant, one of six such tanks painted with aluminum. No other paint can match aluminum's gleaming beauty, durability and ease of application.

This St. Louis supply warehouse is one of 37 Brown Shoe Company plants and warehouses throughout the country which use aluminum paint for maintenance purposes. Brown has found that aluminum-painted ceilings give excellent reflectivity, brighter work areas. Since 1946, Brown has used **APSCO Aluminum Paint** (#1000), manufactured by **Spatz Paint Industries**, St. Louis, Missouri.

One coat of aluminum paint covers doors, stairs and railings formerly painted black, demonstrating aluminum paint's excellent covering power. Ductwork and outside blow pipes of the dust collector system are also protected with aluminum. Painting contractor for this job was **Hartman-Welsh Painting Company**, St. Louis.

APSCO ALUMINUM PAINT used for 37 plants and warehouses of Brown Shoe Company

Aluminum paint has proved to be unequalled for durability, economy and beauty in hundreds of applications such as these at Brown Shoe Company. That's why you find it specified as the standard protective coating throughout industry.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable, up-to-date information on all types of aluminum paint and aluminum asphalt coatings. Use the coupon.

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Please send me your FREE booklets:
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I am interested in protecting_____
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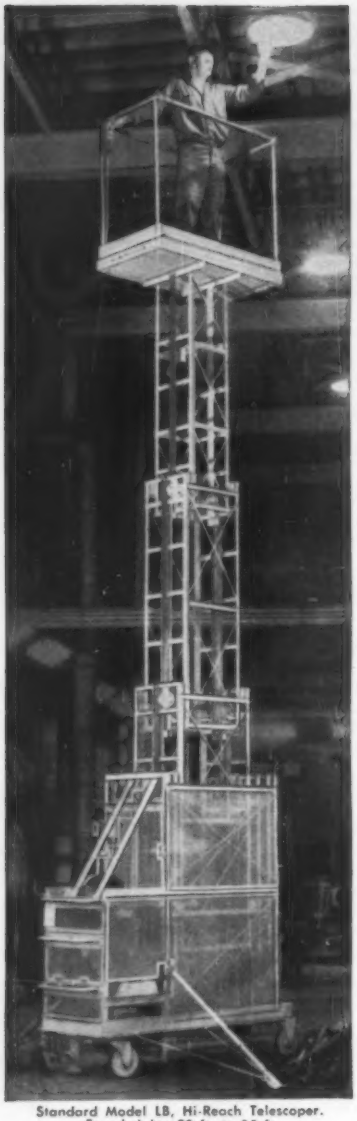


Standard Model LB, Hi-Reach Telescoper. Four heights 20 ft. to 35 ft.

A man who feels safe works better

Economy SINCE 1901

HI-REACH TELESCOPER

ENGINEERED FOR STRENGTH, STABILITY AND SAFETY

Safety is our first consideration in building Hi-Reach Telescopers.

For more than a quarter of a century our engineers have constantly improved the mechanical construction of Hi-Reach Telescopers to obtain maximum stability, smooth time-saving lifting action, and dependable performance.

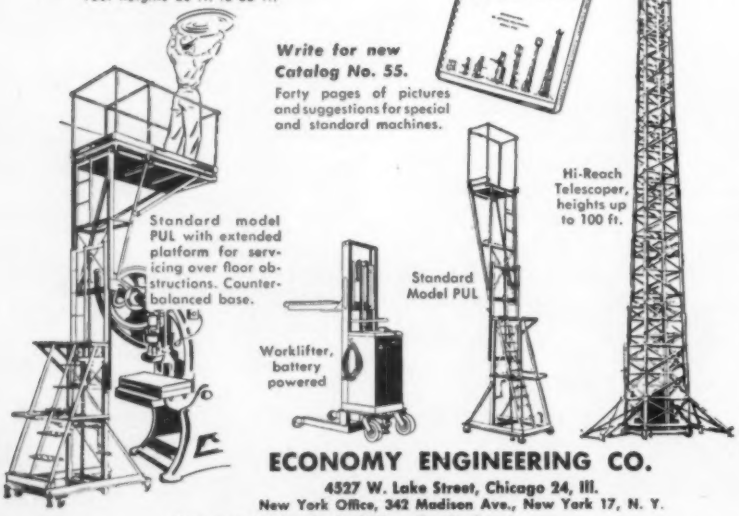
Standard Models available from 10'-9" to 35 ft. high, and custom-built units as high as 100 ft. if you like.

If you have an overhead service problem or need a special material handling machine, Economy can build it. And you can be sure of complete satisfaction in performance.

Economy representatives, trained in engineering, are located in all principal cities. Call one in on your overhead servicing, or material handling problem. Estimates made without obligation.

Write for new Catalog No. 55.

Forty pages of pictures and suggestions for special and standard machines.


Standard model PUL with extended platform for servicing over floor obstructions. Counterbalanced base.
Worklifter, battery powered
Standard Model PUL
Hi-Reach Telescoper, heights up to 100 ft.

ECONOMY ENGINEERING CO.

4527 W. Lake Street, Chicago 24, Ill.

New York Office, 342 Madison Ave., New York 17, N. Y.

For more facts circle 584 on Reply Card

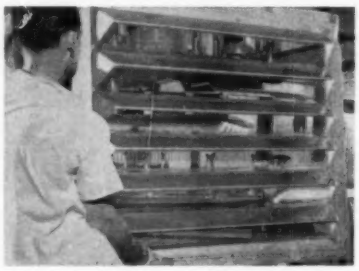
NEW PRODUCTS

(Begins on page 134)

and textile mills. Oils and fats penetrate many belts when carrying such items as doughnuts, peanuts, cotton seed, potato chips, walnuts, fish and fried foods. This causes the cover to swell, crack and break. The nitrile cover will not swell even after long service, company points out. The belt has a light tan cover, is easy to clean, and will be made with a smooth top for horizontal haulage and a rough top for inclines. Hewitt-Robins, Inc.

21—LOUVERED WINDOW controls heat and glare

Lura-Lite Panels—of one-piece molded Plexiglas—control glare and solar heat, it is announced, while distributing light throughout the room. Each louver combines a clear transparent surface with an opaque surface. These windows are de-



signed to permit only required amount of sun's rays to pass into a room; by reflecting some rays outside the building; and by diffusing and scattering others for non-glare lighting in all sections of a room.

Although the windows are usually installed so that louvers are horizontal for maximum daylight control, they may be installed vertically to provide visual privacy or to screen objectionable objects. They may also be had with translucent surfaces alternating with opaque, an arrangement which provides better light control during hours when sun angle is low. Windows are available in standard sizes, or can be fitted to specification. They are non-breakable under normal conditions. Luria-Cournand, Inc.

22—CUT-OFF WHEELS offer faster, cooler cuts

B7 Aloxite Aluminum Oxide Resinoid Wheels are announced as combining all desirable qualities essential to dry production metal cut-off operations. They are reported to produce a faster, cooler cut because of the characteristics of the B7 bond. According to company, a process in the manufacture produces sharp sides on the wheels to prevent binding in the cut.

Three grades are available: "R" for operations that require minimum burn and burr; "T" for general purpose work where some burn and burring is acceptable; and "V" for rough work where

Only one roller chain bears this Trade ® Mark

Trade Mark of Quality

Throughout over 65 years of engineering and manufacturing experience, the Diamond Chain Company has expended all effort in the continuous improvement of one type of product—Roller Chain.

From the raw material specifications through every step of manufacture, heat treatment, shot-peening, preloading, and multiple inspection, a long tradition of highest uniform quality has been indelibly established.

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DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Ind.

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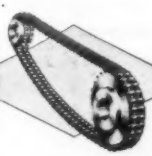
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND  ROLLER CHAINS

DIAMOND ROLLER CHAINS

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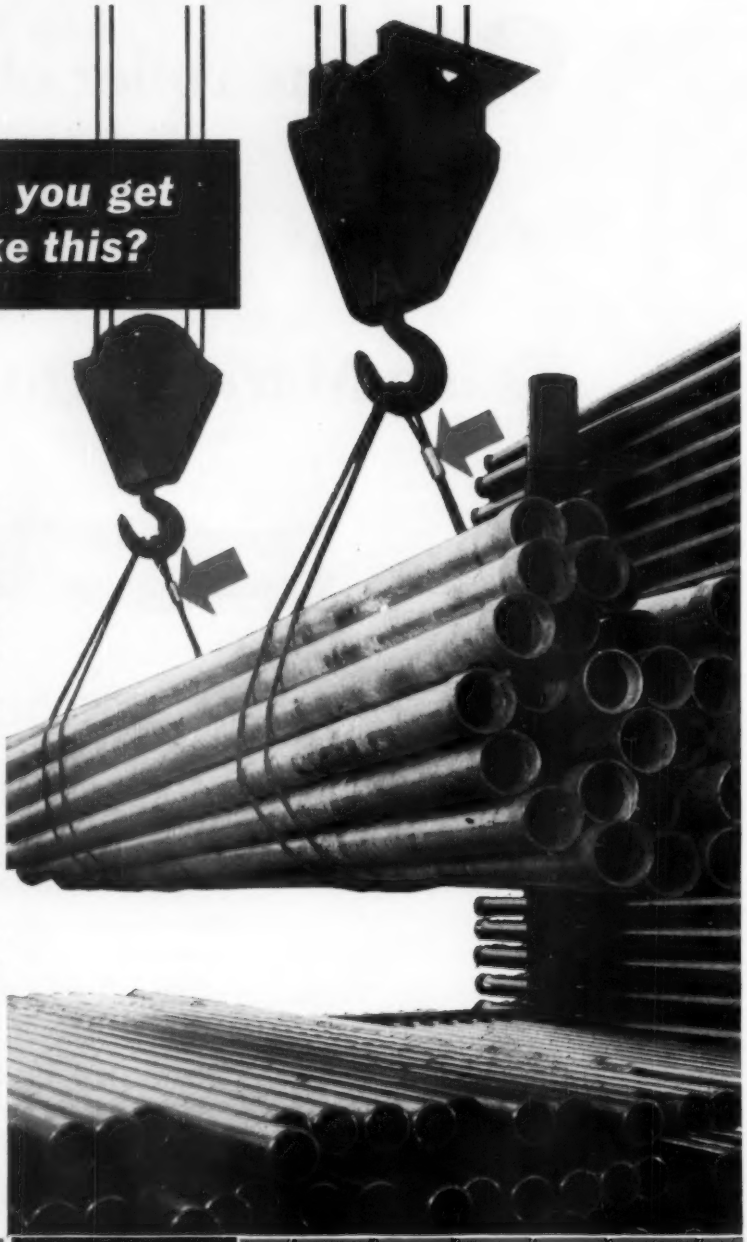
Where can you get a sling like this?



More strength at lower cost —with JalKlamp

Now J&L can furnish safer, stronger wire rope slings and terminals *at lower cost* thanks to JalKlamp, the new sleeve for wire rope splicing, exclusive with J&L.

The reason: Non-corrosive JalKlamps are made from a special alloy. When hydraulically pressed around the rope, the alloy flows into the spaces between the wires and strands . . . produces a neat, permanent, watertight splice that's stronger than any tucked splice. And because they're machine made, JalKlamp splices cost less.

JalKlamp slings and terminals are available for all standard wire rope constructions and in diameters ranging from ⅛" through 2", with SpringKore, PlastiKore, Fiber Core, and Independent Wire Rope Centers.

Specify JalKlamp slings and terminals and get these features:

1. High Strength
2. Economy
3. Non-Corrosive
4. Water Tight
5. Permanent
6. Neat, Safe, — no jagged ends

Jones & Laughlin Steel Corporation
438 Gateway Center, Pittsburgh 30, Pa.

☐ Please send me a free copy of your JalKlamp booklet.

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Title_____

Company_____

Address_____

City_____ Zone____

State_____

J&L STEEL

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 134)

maximum wheel life is most important. Wheel sizes range from 6 to 20 in. diam, and 1/16, 3/32 and ⅛ in. thick. Metal bushings are supplied on arbor holes in the range of ⅝ to 1-⅜ in. Wheels come in 24 to 120 grit. The Carborundum Co.

23—INSULATION RESIN comes in improved form

Improvements are announced for both the resin itself and the packaging of Scotchcast Insulation Resin No. 4. In addition, three sizes on the package are now available—an economy advantage since the resin in the container is intended for use immediately after mixing. This epoxy-type resin in its self-mixing Unipak

container permits making of "factory perfect" splices in power and communications cable under field conditions, says manufacturer. The splice is embedded in liquid resin which hardens quickly without application of heat, to form a permanent, moisture-resistant jacket.

Unlike the former container (which consisted of two packages, one inside the other) the new Unipak is a single package with a barrier strip sealed across the middle, separating resin and activator. Pulling on the sides of the container breaks the barrier strip and lets the resin and activator mix. As before, complete mixing is accomplished by kneading the container. Improvements in the resin provided are said to include greater durability, heat resistance, aging and "mixability." Electrical properties are also claimed to be improved. Minnesota Mining and Mfg. Co.

24—IMPELLER PUMPS for low pressure applications

These Neoprene rubber impeller pumps from ⅜ to 1¼ in. ips (iron pipe size) with flow ranges to 55 gpm are reported to combine the best features of the gear and centrifugal types. They are intended for use where a low pressure, low cost pump is required to transfer any liquid that does not affect bronze or Neoprene, with pressure range to 30 psi, depending on model. Pumps operate quietly in either direction at low or high speeds, company announces.

These pumps can be used for refrigeration, for coolants, and wherever small pumps at a low pressure output are neces-

The Spray Booth Floor Grating That Cleans Itself . . .
engineered by PLANET

At a leading automobile plant, Planet Corporation has designed and installed a 3,400 foot multi-story dragline. It moves auto bodies through a series of lacquer spray booths, and then through drying ovens to the trim line for trim, upholstering, and glass.

Before this installation, the floor grating in the spray booths had to be removed frequently for cleaning because of lacquer accumulation.

Now, the grids are self-cleaning. They move at a rate of a few inches per minute, passing through a series of cleaning tanks under the floor.

The Planet solution to this problem has resulted in a substantial savings in cost and time.

An automatic system of this kind is just one of many ways Planet engineers can help you solve your particular materials handling problem. Their experience and know-how is available, without obligation. Write today.

PLANET CORPORATION
1840 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

"IT PAYS TO PLAN WITH PLANET"
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UCON synthetic FLUIDS and LUBRICANTS

Trade-Mark

. . . a few highlights

Hydraulic fluids
Safety hydrolubes ← To prevent fires where hydraulic lines are located near sources of ignition.
Gear lubricants
Rubber lubricants
Low-temperature lubricants
Packing lubricants
High-temperature lubricants ← Burn off clean, are non-carbonizing.
Heat-transfer media
Compressor lubricants ← Contain no sulfur to poison catalysts. Often permit higher operating temperatures.
Grease components
Electric motor lubricants
Lift-truck lubricants ← For long service, few overhauls, fast starting, no smoke.
Textile lubricants
Defoamers
Demulsifiers
Metal-working fluids ← Water-clear cutting fluids. Especially good on titanium and other hard-to-work metals.
Cosmetic oils
Ink and dye diluents
Leather softeners
Solvents
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You'll find that UCON Fluids and Lubricants can do a job *better* for you. Write *today* for the booklet "UCON Fluids and Lubricants" (Form 8326).

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CARBIDE AND CARBON CHEMICALS

For more facts circle 588 on Reply Card

NEW PRODUCTS

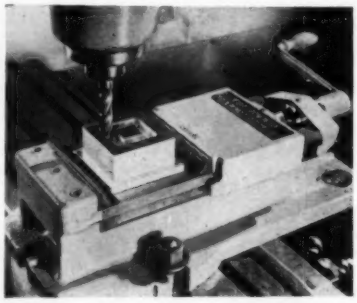
(Begins on page 134)

sary. Impeller is replaceable at low cost and keyed to shaft for easy application. Pump itself is made of bearing bronze; shaft is stainless steel. It is designed to pass small particles of foreign matter and abrasives without jamming. Unit is self-priming to about 15-20 ft when wet and should operate at lowest speed commensurate with good delivery. Speeds range from 100 to 1750 rpm. Pumps are supplied to operate with standard high starting torque motors from ⅓ hp up. American Machine Products, Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

25—MILLING VISE grips work from bottom

The IMP Hold-Down Vise has automatic pull-down jaws which grip the work ⅛ in. from the bottom. This permits easy milling of sides to ⅛ in.



shoulder. Operator needs only to place work-piece on base of vise and tighten by hand. No parallels are required, and it is not necessary to hammer work to seat it. Jaws may be revolved for easy cleaning, or replaced with special jaws for irregular work. The standard vise opening is 4 in.; however, an optional stretching block gives the vise 6-in. capacity. A swivel base is also optional. Bulletin F-84 gives further details. Illinois Metal Products.

26—PRESSURE SWITCH senses the differences

Diaphragm Pressure Switch 227 accurately senses a pressure difference from 0 to 45 in. of water between a variable and a reference pressure, it is announced, with a fixed actuation value of 0.5 in. of water. Reference pressure must be air or an inert gas; variable pressure may be a liquid or gas. Switch will actuate an electric circuit on an increase or decrease of a predetermined pressure difference. It can be readily adjusted by

Wagner®
TRANSFORMERS
...the choice of leaders in industry

for shorter runs of copper... reduced line losses... lower installation expenses...

get the right voltage close to the load

with a

Wagner Dry-Type Transformer

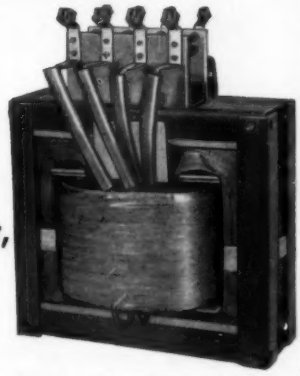
Wagner Dry-Type Transformers give dependable power distribution right at the load... close to your portable tools, machines or lighting system. This means a big savings to you in terms of shorter runs of copper, reduced line losses and lower installation expenses. Not only that, Wagner Dry-Type Transformers are compact, light in weight and safe to use—even in the presence of fire hazards.

The new 150° rise, totally-enclosed dry-type transformer with silicone insulation, is designed especially for use where ventilated transformers are impractical. When you install these transformers, fireproof vaults and other protective enclosures are unnecessary. Core and coil is protected from lint, moisture, dust and other contaminating materials by totally-enclosed sheet steel cases... and this kind of protection reduces maintenance to almost nothing. They can be installed outdoors, because their construction is completely weatherproof.

The 150° rise transformer is standard in ratings 3 through 10 kva and is also available through 50 kva. The 55° rise model is standard in 1, 1½ and 2 kva and the 80° rise transformer is standard in ratings 15 through 100 kva.

Wagner®
Form W

Core and Coil permits compact, lightweight transformers...



The heart of each Wagner Dry-Type Transformer is the famous Wagner Form W Core and Coil assembly. Core is of cold-rolled oriented grain transformer steel. The Form W design permits less weight per kva and small size cases for space saving installation.

Wagner Electric Corporation
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

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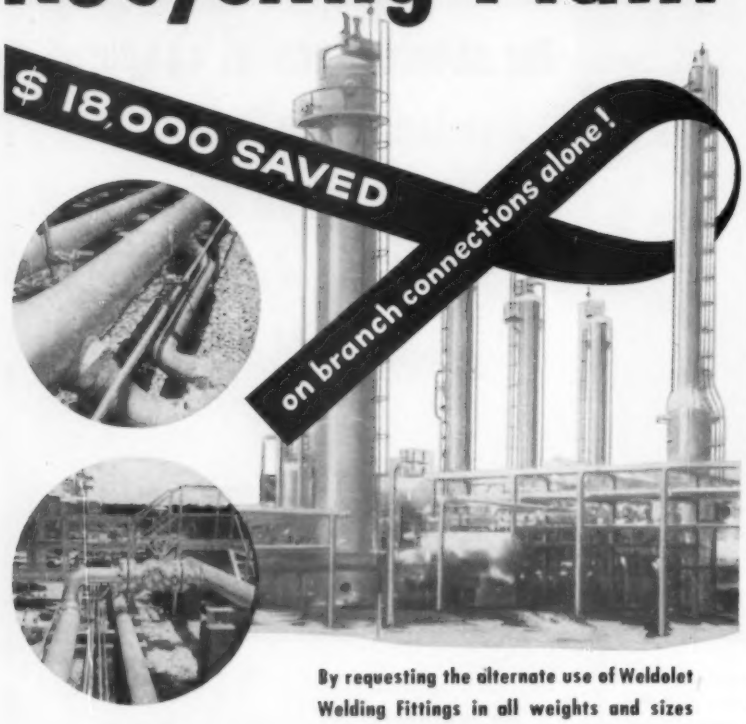
4500 psi Recycling Plant



By requesting the alternate use of Weldolet Welding Fittings in all weights and sizes the piping contractor was able to lower his bid sufficiently to be awarded the job!

This recently completed recycling plant in Louisiana was designed and engineered in full accordance with the ASA and ASME Codes and operates at a maximum pressure of 4500 psi and 225°.

The piping engineers on this job were confronted with a number of tough problems. The plant was to be operated at extremely high pressures. The terrain was swampy which meant the fittings had to withstand the additional stresses exerted by a settling foundation. The piping also had to stand up under rugged vibration conditions. The many design features of Weldolet Welding Fittings in both full size and reducing size outlets provided the safe, practical and most economical answer to these knotty service problems.

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

727 MEADOW STREET, ALLENTOWN, PENNA.

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 134)

means of an external adjustment screw for field setting. Switch is not sensitive to jarring or vibration and its tamper-proof external adjustment keeps it from being accidentally disturbed. It will operate in any position—no leveling or special mounting is necessary. It incorporates a U.L. approved s.p.d.t. snap action switching element rated for a-c and d-c. A splash-proof housing protects it from dust or damage in exposed installations. Barksdale Valves.

27—STORAGE RACK permits first-in first-out use

First-in, first-out live storage of boxed or palletized loads, tote pans can be gained with this live storage rack, it is

announced. Strong wide-based, "hat-section" design of live rails makes them ideal for racks, company points out. These racks have about half the number of rails used in many racks; the rails have two rows of wheels, and each rail serves two lanes. Guards are built integral with the rails, eliminating separate guard mounting. According to manufacturer, assembly is simple, width of lanes can be changed quickly on the job. Length, width and height can be varied to suit. The Alvey-Ferguson Co.

28—SHEAVES, single groove, for fhp, light duty drives

Lightweight Texlite sheaves are announced for fractional horsepower and light duty industrial drives. The line includes single-groove sheaves in both bushed and bored-to-size construction with "A" section grooving or "A-B" grooving. Allis-Chalmers Mfg. Co.

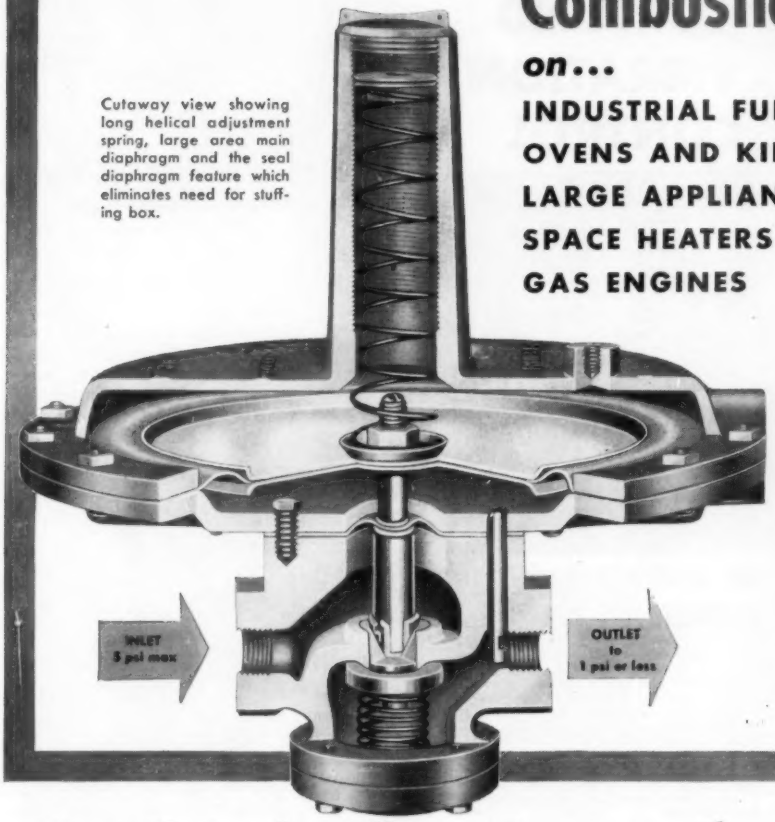
29—CORDS, CABLES feature increased Neoprene

Portable electrical cords and cables in the Bronco 66 Certified line have an outer protecting jacket containing more than 67 per cent new Neoprene, says manufacturer. The increased Neoprene content in the jacket compound is claimed to give greater protection against factors which tend to attack portable power cables—oil, sunlight, ozone, abrasion,

Looking for Improved Combustion Control?

on...

INDUSTRIAL FURNACES
OVENS AND KILNS
LARGE APPLIANCES
SPACE HEATERS
GAS ENGINES



Cutaway view showing long helical adjustment spring, large area main diaphragm and the seal diaphragm feature which eliminates need for stuffing box.

Look into

Rockwell "120"

Gas Pressure

Regulators

First Choice for All Low Pressure, Close Control Services

When you need extremely accurate combustion control over pressure ranges of from 1 psi to zero or even vacuum, the Rockwell "120" regulator will serve you best. The extra large main diaphragm and friction-free seal diaphragm provide a construction unmatched for sensitivity and response. The "120" regulator adapts readily to special applications. For example, you can use it as a back pressure regulator, a pressure relief valve, a non-return valve, a flow controller, a shut-off valve or a proportioning control. In many services remote control can be applied. Flanged or screw ends available.

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Gentlemen:

Please send me bulletin 1044 describing the "120" regulator ☐. Please quote me on_____" regulators. Please have your field representative call ☐.

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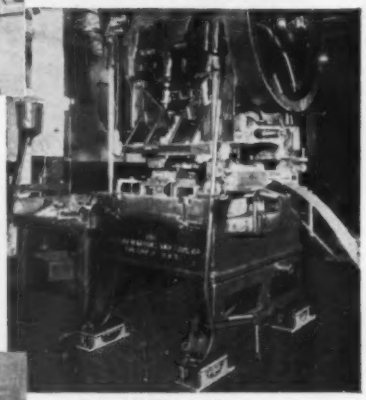
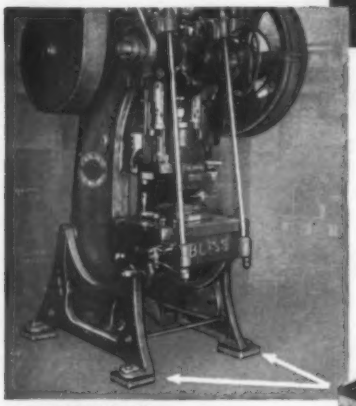
For more facts circle 591 on Reply Card

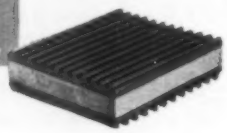
STOP VIBRATION with KORFUND VIBRATION CONTROL

A TOUGH PROBLEM solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000# 600 ton capacity press was cracking building walls. Four specially designed 25,000# capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600# each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.





AN AVERAGE PROBLEM—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation anywhere (even near precision equipment) for better plant layout, increase press speed and production, improve quality.



A SIMPLE PROBLEM solved inexpensively and effectively by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, effective vibration and noise control, and eliminate bolting to the floor.

PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

For specific recommendations, contact us or the Korfund representative you'll find in most principal cities. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-33R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

Visit us at Booth 1102, Plant Maintenance Show — January 23-26.

For more facts circle 592 on Reply Card

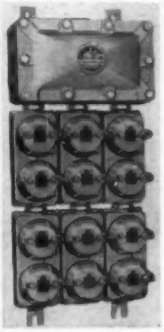
NEW PRODUCTS

(Begins on page 134)

flame, acids, solvents, heat, abrasion and crushing. The new cords and cables are vulcanized by a process designed to produce a smooth jacket and impart flexibility. Jackets are branded every 2 ft. Vulcanized into the outer jacket are product name, type, number of conductors, rated voltage, other information. A wide range of types and sizes is offered. The Western Insulated Wire Co.

30—PANELBOARDS are explosion-proof, dust-tight

Especially developed for hazardous locations and for installations where corrosive vapors, non-combustible dusts or moisture are present, Type EWP Panelboards with circuit breakers combine compact design with explosion-proof and dust-tight construction. The condulet assemblies, functioning either as load centers or panelboards, provide circuit protection on wiring systems up to 120-v. Accessible

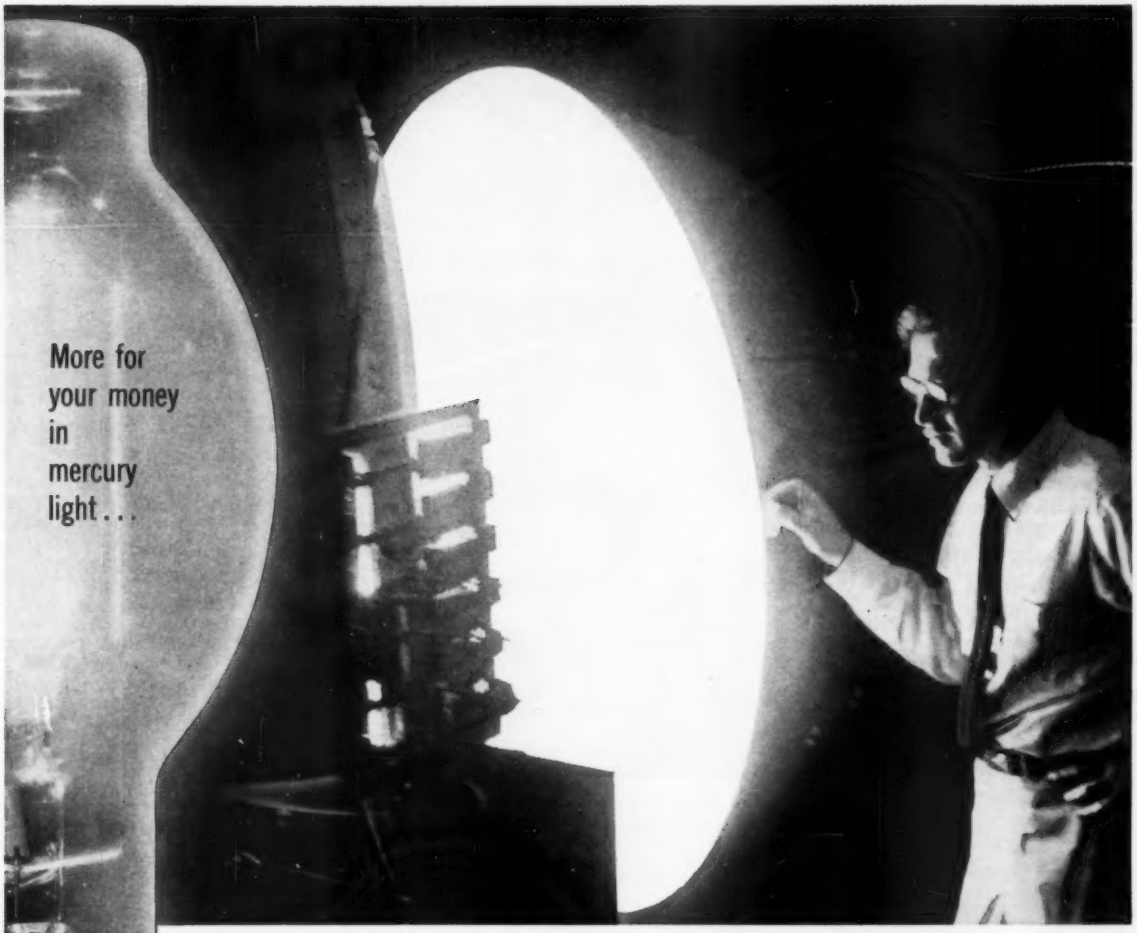


for connecting main and branch circuits on installation, all terminal blocks are located in upper housing, which is available in two sizes. The smaller terminal block housing is used for panels with up to 12 single-pole circuit breakers (or six two-pole breakers); the larger, for panels with up to 24 single-pole circuit breakers (or 12 two-pole breakers).

Circuit breaker housings, containing either two single-pole or one two-pole breaker, have external operating handles, which can be padlocked in on or off position. Thermal-magnetic circuit breakers are trip-free from these handles, it is noted, and cannot be held closed under overload or short circuit. Regularly arranged for mounting with branch conduit openings at top, panelboards can be furnished inverted with branch connections at bottom. Crouse-Hinds Co.

31—COOLANT CHILLERS save floor space

This line of compact coolant chillers saves floor space, it is announced, and increases machine efficiency with higher production. Line includes both horizontal and vertical cabinet units, in sizes ranging upward from 5 gpm. Model X hori-



NEW, INCREASED LIGHT OUTPUT FOR 13 WESTINGHOUSE MERCURY LAMPS

Now—through advanced design and manufacturing techniques—the most widely used Westinghouse Mercury Lamps give you more light when *new*, more light *for life*.

Look at the following chart. It shows the new boost in initial light output for just two of the most widely used Westinghouse Mercury Lamps . . .

Lamp	Initial Lumens	
	Old Rating	New Rating
400-watt E-H1	20,000	21,000
400-watt J-H1	19,000	20,000

And there are similar high increases for *eleven* other popular Westinghouse Mercury Lamps.

But that's only half the story! For not only do these new, improved Westinghouse Mercury Lamps give increased light output to start with, they also *maintain* higher light output throughout their long life. For example . . .

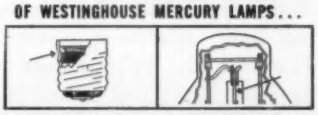
Lamp	Approximate Lumens at 4000 Hours	
	Old	New
400-watt E-H1	15,000	15,800
400-watt J-H1	14,000	14,700

These new Westinghouse Mercury Lamps are absolutely unequalled for *long useful life*. So today, even more than before, Westinghouse Mercury Lamps are by far your best buy for all high-intensity lighting.

This significant advance in Westinghouse Mercury Lamp performance is further evidence of Westinghouse leadership in mercury lighting—one more proof that Westinghouse Mercury Lamps give you *"more for your money in mercury light."*

Westinghouse Guarantees the service life of all its widely used types of quartz mercury lamps. For full details call your Westinghouse Lamp Representative—or write Westinghouse Lamp Div., Dept. PE-2, Bloomfield, N. J.

TYPICAL MONEY-SAVING FEATURES OF WESTINGHOUSE MERCURY LAMPS...



Hi-Temp life-time-tight bases—non deteriorating bonding material eliminates costly problems of loose bases, cracked bulbs, breakage when lamps are removed from sockets.

Molybdenum Ribbon Seals—just .005" thick—permit easy expansion and contraction of lead-in wires and bulb material. Result: longer lamp life, fewer early failures.

YOU CAN BE SURE...IF IT'S Westinghouse

Ask about new Westinghouse WEATHER DUTY(TM) Mercury Lamps!

For more facts circle 593 on Reply Card

Norgren Spray-Lube System as applied by Square D Co.

to multiple tapping operation, speeds production 30%

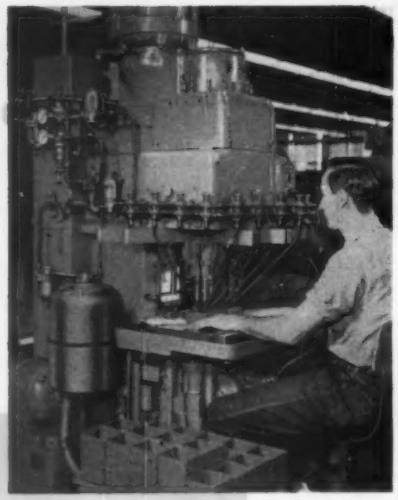
and in addition:

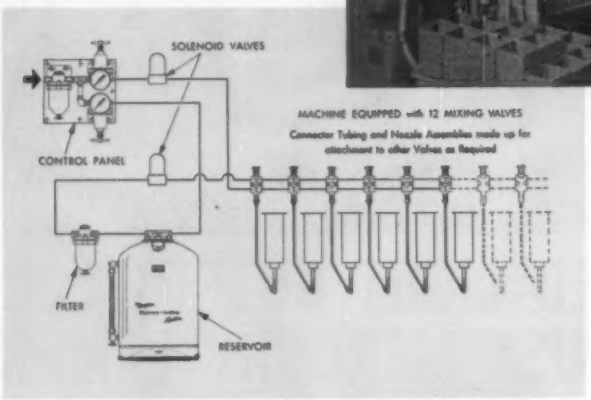
eliminates time and labor formerly required for draining and wiping tapped parts

relieves one man for more productive work

elimination of flood system greatly improves working conditions

substantial saving in lubricant




SOLENOID VALVES
CONTROL PANEL
MACHINE EQUIPPED with 12 MIXING VALVES
Connector Tubing and Nozzle Assemblies made up for attachment to other Valves as Required
FILTER
RESERVOIR

This tapping machine in the Square D Company production line handles a wide variety of tapping operations requiring as many as 12 taps in simultaneous operation. On job shown, tapping 3 holes in each of 2 switchbox covers, Norgren Spray-Lube System increased production 30% . . . eliminated the cleaning process. Even greater increases were reported on other jobs.

The unpleasant and hazardous disadvantages of the previous flood system, splashing lubricant over the operator and the surrounding floor, has been eliminated by Spray-Lube. Lubricant saving (Stanicut No. 107) has been substantial. Solenoid valves permit the Spray-Lube System to be actuated only when taps are approaching and contacting the work.

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

For complete data on this Norgren Spray-Lube application write for Blueprint SL 5 or phone the Norgren representative listed in your telephone directory classified section under Norgren Pneumatic Products.

For more facts circle 594 on Reply Card

NEW PRODUCTS

(Begins on page 134)

zontal unit is made in sizes ranging from 2 through 7½ hp. Chillers measure 46 in. long, 26 in. wide and 30 in. high. Units are designed for stacked multiple installations to save floor space and provide uninterrupted operation. Model H-T vertical unit, with a 7½ hp semi-hermetic unit, is only 26 in. square, 50 in. high and will handle 30 gpm with a 6 deg temperature difference. These units, called Lundholm Liquid Chillers have welded steel forms, sheet metal cabinets. Industrial Filtration Co.

32—GATE VALVE designed to provide tight shut-off

Impenetrable shut-off, both on the upstream and downstream side of the wedge, is announced for this gate valve. In addition to the metal-to-metal contact of the wedge and valve body seats, this valve incorporates a pair of Teflon packing seals which press tight against the wedge to form a seal. Stainless steel locking rings and seats make the valve impervious to corrosive fluids, manufacturer points out, and the replaceable stainless steel seat is lightly welded into the valve body to prevent leak-through. Hamer Valves, Inc.

33—TORQUE ANALYZER for power screwdrivers

This instrument gives a fast, direct torque reading and indicates the area of trouble in defective tools without disassembly, it is announced. The torque

analyzer utilizes the principle of driving a stud in a nut against a sensitive pressure gage. According to company, the easily-read 2⅝ in. dial speeds setting or checking the torque output of stall motor power screwdrivers, direct drive clutches and the Livermont Torque Limiter, as well as hand torque screwdrivers and wrenches. The analyzer operates in a right hand direction. Richmont, Inc.

34—WELDING HEAD for automatic applications

This new unit is designed for automatic welding applications employing company's Aircomatic process, an inert gas consumable electrode method. Argon, carbon dioxide and helium shielding gases and all kinds of welding wires (steel, aluminum, bronzes, stainless, and Strandalloy)

Now WALWORTH *PVC* VALVES and FITTINGS

give you the greater protection and longer service of *all-plastic* piping systems!

The new Walworth plastic Valves and Fittings are made of rigid polyvinyl chloride which is non-aging, non-corrosive and non-toxic and has extremely low flammability and high resistance to chemical attack. Walworth PVC products are molded by General American Transportation Corporation. Each product bears the stamp of Walworth's long established engineering skill and reliability — your assurance of safe, trouble-free valves and pipe fittings.

Walworth PVC Y-Globe Valves are designed to regulate the flow of alkalis, acids, inorganic salt solutions and other troublesome fluids commonly found in food, chemical and allied industries. They will give exceptional service at temperatures as high as 150°F and are designed for use with schedule 80 pipe. Other features of these valves include: (1) Three chevron, Teflon packing rings give you a leak-proof seal without binding the stem. (2) No useless threads to accumulate troublesome dirt because no stem threads enter the interior of the body. (3) Snap-on spherical plug with ball-to-cone seating arrangement to assure a tight line-contact seal between disc and seat regardless of any minor inaccuracies in alignment. (4) Full 45° angle of stem with center line of pipe to reduce pressure drop and turbulence. (5) Generously designed flow passage at the valve seat for a more even flow. (6) Back seat design allows repacking when wide open under pressure. (7) Polyethylene bonnet gasket to assure a perfect body-to-bonnet seal.

Walworth PVC Diaphragm Valves come equipped with neoprene discs. Other diaphragms especially suited to your application can be furnished. "R-2" rubber diaphragms are commonly used in systems handling dilute acids and alkalis. "J-1" Teflon diaphragms are recommended for maximum chemical resistance. Valve design features: (1) No stuffing box or packing to replace. (2) A resilient diaphragm connected to the compressor by a stud assures a leakproof closure on the body weir or valve seat even when slurries or semi-solids are in the line. Diaphragm easily replaced without removing the valve from the line. (3) Streamlined flow area in valve body makes valve self cleaning and allows fluids to flow equally well in either direction. (4) Separation of valve body from the sealed metal bonnet protects fluids from contamination. Fluids contact only the valve body and diaphragm. (5) Completely enclosed metal bonnet protects stem from breakage and distortion.

Walworth PVC Fittings assure uniform thermal expansion of pipe and fitting threads when used on plastic pipe. They eliminate the danger of jammed threads, loose joints and the chance of galvanic corrosion. These screwed pipe fittings are: (1) Designed for use on schedule 80 of plastic pipe. (2) Walls are of uniform thickness accurately molded. Proportions are skillfully worked out in all sizes and types of fittings. (3) Fittings are chamfered to protect the thread and afford easy entrance of the pipe. Long bands provide reinforcement at the points of severest strain.

This booklet contains all the details about Walworth PVC products that you'll want to know. It describes mechanical and thermal properties, working pressures, sizes and dimensions, application and assembly data. For your free copy write to us. Please use company letterhead.

WALWORTH

valves . . . pipe fittings . . . pipe wrenches

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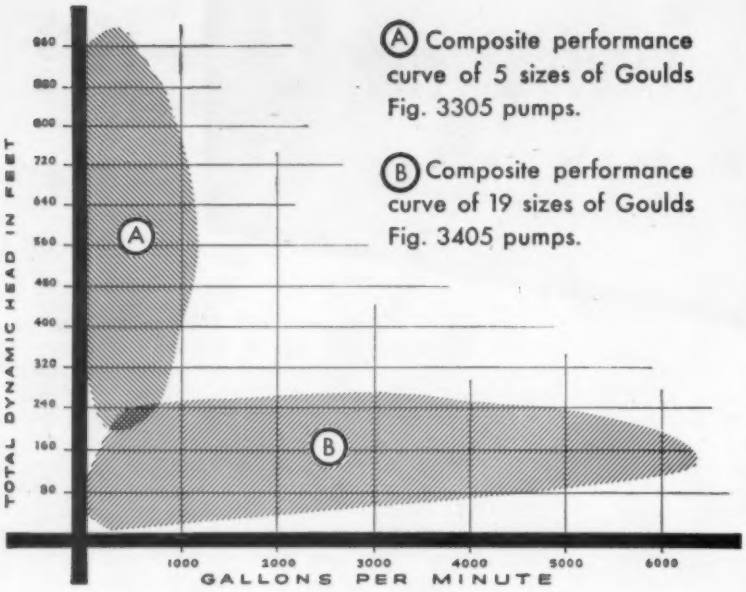
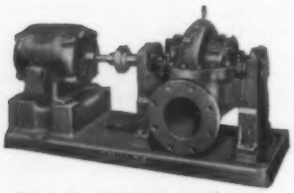


Ⓐ Composite performance curve of 5 sizes of Goulds Fig. 3305 pumps.

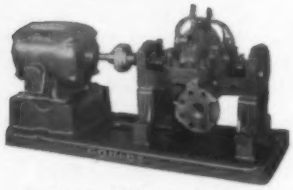
Ⓑ Composite performance curve of 19 sizes of Goulds Fig. 3405 pumps.

Do you need **pumping capacity?**

. . . or head? . . . or both?



Goulds Fig. 3405 single-stage pump.



Goulds Fig. 3305 two-stage pump.

With these two groups of Goulds centrifugal pumps you can meet an extremely wide range of pumping requirements.

For volume pumping, 19 sizes of the Fig. 3405 single-stage, double-suction pump provide capacities up to 6,400 GPM, and heads to 280 ft.

For greater pressure requirements 5 sizes of the Fig. 3305 two-stage pump provide heads up to 1,000 ft., and capacities to 1,200 GPM.

Both of these groups of pumps have important new design and construction features that insure efficient operation and long life. Yet, because so many of their parts are interchangeable, *you can cut your parts inventory in two—or better.*

For example, you need only 3 different shafts for all 24 sizes of pumps in both groups.

We'd like to send you additional details about these pumps, including specifications and performance curves. Just write for Bulletin 721.6 about the Fig. 3405 single-stage pumps, and Bulletin 722.6 about the Fig. 3305 two-stage pumps. We'll be glad to send you copies of both.

MEMBER HYDRAULIC INSTITUTE U.S.A.

Goulds PUMPS INC. Seneca Falls New York

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • TULSA

For more facts circle 596 on Reply Card

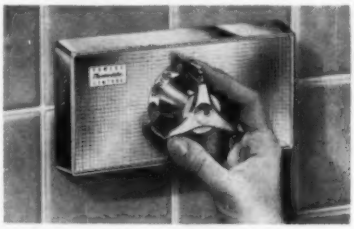
NEW PRODUCTS

(Begins on page 134)

from 0.030-in. diam and up, can be used, says manufacturer. The head is low priced because of the single motor drive, it is noted, and simplified controls, with optional control advantages at additional cost, offer advantages over previous models. Compact in design, the new head has a continuous current rating of 600 amp. Air Reduction Sales Co.

35—SHOWER CONTROL has a built-in thermostat

Protection against shower injuries due to sudden temperature change is claimed to be provided by the Type H Hydroguard. The bather has only one dial to



turn and there is only one hole in the tile wall. This simpler installation also serves to reduce costs and improve appearance. The thermostatic mixer used by the Hydroguard safeguards against both pressure and temperature changes in water lines, it is explained, and failure of either cold or hot water supply shuts off the shower. Strainer-check-stop fittings are concealed beneath the cover of the control and are accessible by removing the dial. Two types of installation are available: with concealed piping, shown, or exposed piping. Bulletin 366 gives details. Powers Regulator Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 181-182. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

36—SURFACE FINISH for outside, above-grade walls

Teflate is described as an odorless, quick-drying, durable and attractive finish which sets up a moisture barrier that shuts out all water penetration of outside, above-grade walls. It has an attractive surface film and according to manufacturer its penetration, adhesion, and retarded chalking characteristics assure years of service. Material is said to have excellent resistance to chemical fumes, salt water, grease, oil, sea air and smog. It is suggested for all but

Now the finest of needle valves is available

416 Stainless throughout...

In the Marsh Needle Valve, operating men found a valve that was better all the way through. Then came the call for a valve of like quality and precision for corrosion service . . . to be 416 stainless steel throughout.

The valve illustrated here is the answer. Like the parent valve, this new valve has safety and strength to spare . . . guaranteed for working pressures up to 10,000 psi . . . equally efficient and effective in any lower pressure range.

It too is machined from solid bar stock—in this case, 416 stainless steel. Its precision-ground and-machined stem is hardened 416 stainless. Packing is the special "Marpak" ring . . . one-piece, non-binding, long-lasting. So finely built is this needle throttling and cut-off valve that it can be easily throttled down to exceptionally fine regulation even on extreme pressure.

Read the list of features opposite. Then write for new bulletin No. NV-2 containing complete details.

416 Stainless Steel ...all the way through!

- Body and stem guide machined from bar stock.
- Valve stem, hardened stainless.
- Packing, special Marsh "Marpak" moulded ring.
- Fine stem threads for strength and precision throttling.
- Deep inlet and outlet thread chambers.
- Bodies marked in accordance with MSS regulations.

Maximum Working Pressure 10,000 P.S.I.

Water, oil, gas or corrosive fluids not injurious to 416 stainless steel.

The new all stainless valves (Series 1924) includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾", 1"; also globe and angle valves with male inlet and female outlet in sizes ¼" and ½".

MARSH INSTRUMENT CO. Dept. W, Skokie, Ill.
Sales affiliate of Jas. P. Marsh Corp.

Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd Street, Edmonton, Alberta, Canada

HOUSTON BRANCH PLANT: 1121 Rothwell Street, Sect. 15, Houston, Texas

MARSH

"THE STANDARD OF ACCURACY"

For more facts circle 597 on Reply Card

PRESENTING THE ALL-NEW

Dings DYNAMIC

PERMA-PLATE MAGNETS

FOR EFFICIENT—LOW COST TRAMP IRON REMOVAL

4 ALNICO NON-ELECTRIC TYPES WITH EFFECTIVE MAGNETIC RANGES UP TO 4"

DINGS—The world's largest exclusive builder of magnetic separation equipment—now brings to all industry an entirely new concept of efficient, low cost tramp iron removal . . . through the completely new line of non-electric Alnico Perma-Plate Magnets, incorporating the *DYNAMIC* principle of magnetic separation.

Designed and built to remove tramp iron from moving material carried in chutes, ducts, on conveyor belts and slides, these new powerful, guaranteed permanent Alnico V magnets are used to separate iron from grain, feed, chemicals, foodstuffs, plastics, fertilizers, minerals, textile fibers, liquids and wet and dry solids of many kinds. Perma-Plates are also needed wherever tramp iron or iron of abrasion can damage processing equipment, create fire hazards, or contaminate product purity.

Clip the coupon for full details.

The new Dings DYNAMIC Perma-Plates are plate type permanent non-electric Alnico magnets designed to attract moving iron. This proven design is the result of hundreds of extensive *dynamic* tests . . . *not* based on static tests.

As shown by illustrations (1) and (2), a *pull test* is a static test having negligible bearing on the magnet's ability to attract rapidly moving iron. It is not *dynamic.*

Illustration (3) shows a *lift test,* again a static test having negligible bearing on the magnet's ability to attract moving iron. It is not *dynamic.*

Illustration (4) shows a *chute test* . . . the only *true* test of a plate magnet's ability to attract rapidly moving iron. *This is the DYNAMIC principle of operation of the new Dings Perma-Plate Magnets.*

The new Dings Perma-Plates are available in 4 basic types, offering effective magnetic ranges from 2½" through 4". Each type is available in 35 standard sizes from 4" through 72" wide.

Complete details of these versatile DYNAMIC Magnets are given in the new Catalog 1205-D, just off the press. Mail coupon for your copy.

Dings

DINGS MAGNETIC SEPARATOR CO.
4766 W. Electric Ave.
Milwaukee 46, Wis.

MAIL THIS COUPON TODAY

DINGS MAGNETIC SEPARATOR CO.
4766 W. Electric Ave., Milwaukee 46, Wis.

Send copy of new Catalog 1205-D to:

Name_____

Company_____

Address_____

City_____ Zone____ State_____

PP1.55⅓

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NEW PRODUCTS

(Begins on page 134)

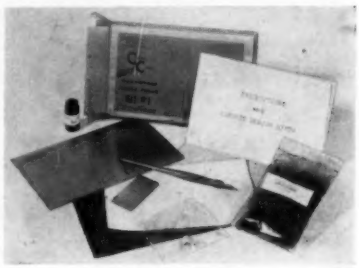
wood surfaces and is claimed to be alkali-proof, dirt repellent, non-chipping and will not flake, blister or peel. Material comes in eight colors plus white, and has a coverage of approximately 300 sq ft per gallon, per coat. Flexrock Co.

37—SPRAY VALVE incorporates parabolic plug

Designed for use with company's deaerating heaters and hot process softeners, this spray valve is said to greatly increase efficiency of these units. The main feature of the valve is a parabolic plug of special construction which is said to provide a constant flow angle under all conditions. By means of this plug an unvarying, even spray pattern is obtained with pressures and flow rates ranging from 3 to 150 per cent. Valve is made of corrosion-resistant stainless steel, is reported to require no maintenance. Graver Water Conditioning Co.

38—PRINTED CIRCUIT KIT aids electronic planning

Announced as especially useful in the early stages of research and development work in the electronic field is this do-it-yourself printed circuit kit. It lets you



evaluate printed circuit designs before passing them along to a production planning department. The package contains a sheet of copper-clad laminate, 8½ by 5 in. and other materials required to make etched or printed circuits. Also included is an instruction booklet and printed circuit design hints. According to manufacturer, the kit can be used to make two average size "miniaturization" circuits or one "standard" size circuit. Control Circuits, Inc.

39—WATER HYDRANT is sanitary and frostproof

Designed for use wherever hydrant freezing is a problem, the No. 840, is announced as a sanitary frostproof water hydrant—a self-de-icing unit which operates efficiently in coldest weather. De-icing is accomplished by an elastic water tube lining that contracts after each use of hydrant. Only a small quantity of water remains in tube and along internal separator strip, where it forms thin ribbons of ice. When valve is again

61 Units Answer the Big Dust Question!

"How can we best collect the dust coming from a large battery of grinding machines and cleanse the air so well that it can be recirculated?"

That's right — that was the question at a leading automobile manufacturing plant.

One of the contestants was the packaged design Aerodyne Type CFF Dust Collector, as illustrated. On test, it answered all the questions — on collection efficiency, on compactness of installation, on first cost, on operating cost. It won the contest, and today 61 of these packaged Aerodyne units are installed on that battery of grinding machines.

Tests made on the actual grinding dust production line showed better than 99.8% removal of all particles down to 0.3 micron size. The recirculated air was four times purer than "country fresh" air! And it retained the heat and humidity desired for optimum conditions in the plant.

What's the nature of the dust in your plant? Is it valuable? Is it disagreeable to you — or to your neighbors?

Send us an outline of your present or proposed operation where dust is or will be involved. Our dust collection specialists will be glad to outline a complete, detailed Aerodyne system, custom engineered to your requirement.

THE GREEN FUEL ECONOMIZER COMPANY

POWER AND PROCESS PLANT EQUIPMENT

NEW YORK • CHICAGO • DETROIT

Representative in Principal Cities

BEACON 3, NEW YORK

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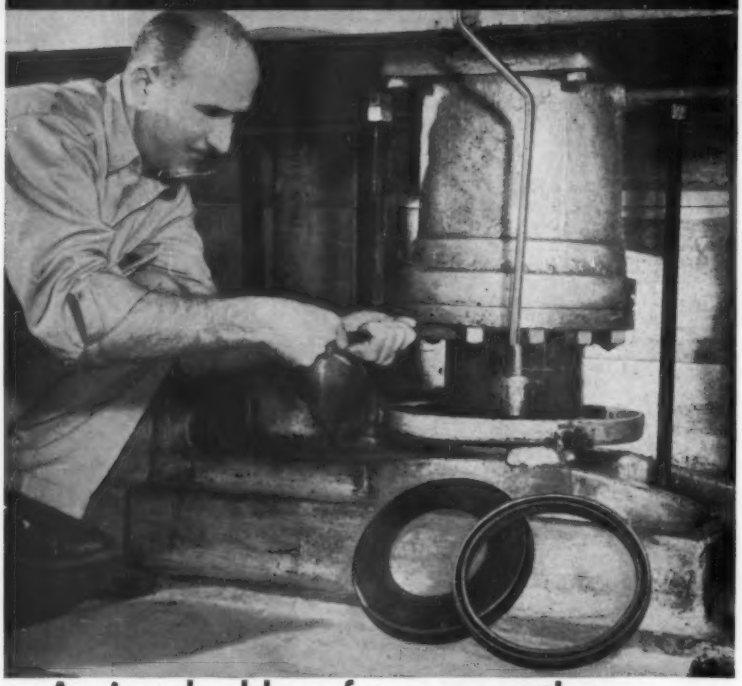
If you maintain Cylinders and Presses . . . you'll want RHOADS NEW PACKING HANDBOOK



An invaluable reference on the application and maintenance of *Packings for Hydraulic and Pneumatic equipment*

Here it is, just off the press, Rhoads new 56 page handbook on the design and application of hydraulic and pneumatic leather packings! Every subject from "What is a packing and how it is used" to "Maintenance of Packings" is thoroughly covered.

Written and edited by the leading manufacturers of mechanical leather packings, the data and principles contained in it have been approved by the leather packing industry.

This book is a publication of the National Industrial Leather Association of which J. E. Rhoads & Sons is a member.

As a contributor to this book and the manufacturer of famous Tannate Leather Packings, J. E. Rhoads & Sons will be happy to send you a copy. Please use the coupon below or write on your business letterhead.

You are cordially invited to stop at our Booth No. 822 while attending the Plant Maint. & Engr. Show in Phila. January 23-26.

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Gentlemen:
Please send me a free copy of Rhoads new Packing Handbook. No obligation, of course.

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*Firm*_____ *Street*_____

*City*_____ *Zone*_____ *State*_____

For more facts circle 600 on Reply Card

NEW PRODUCTS

(Begins on page 134)

opened, water rushing in under pressure quickly breaks up, melts and evacuates ice through the spout. With this construction the hydrant does not need usual underground drain-off.

Another feature is easier access for servicing. The galvanized cast iron cap is readily lifted after removing two retaining screws. Entire valve assembly can then be lifted through top of standpipe without disturbing standpipe or housing. Cam and lever operated valve utilizes line pressure to help it close and keep it closed. All parts of hydrant are made of rust resistant materials, company says, with galvanized steel for standpipe and spout, brass for valve body and silicon bronze for valve stem. Hydrant operates on cold water pressures of from 20 to 100 psi and delivery in gallons per minute approximately equals water pressure. It has a 1½ in. female outlet and the spout height is 30 in. above ground. Crane Co.

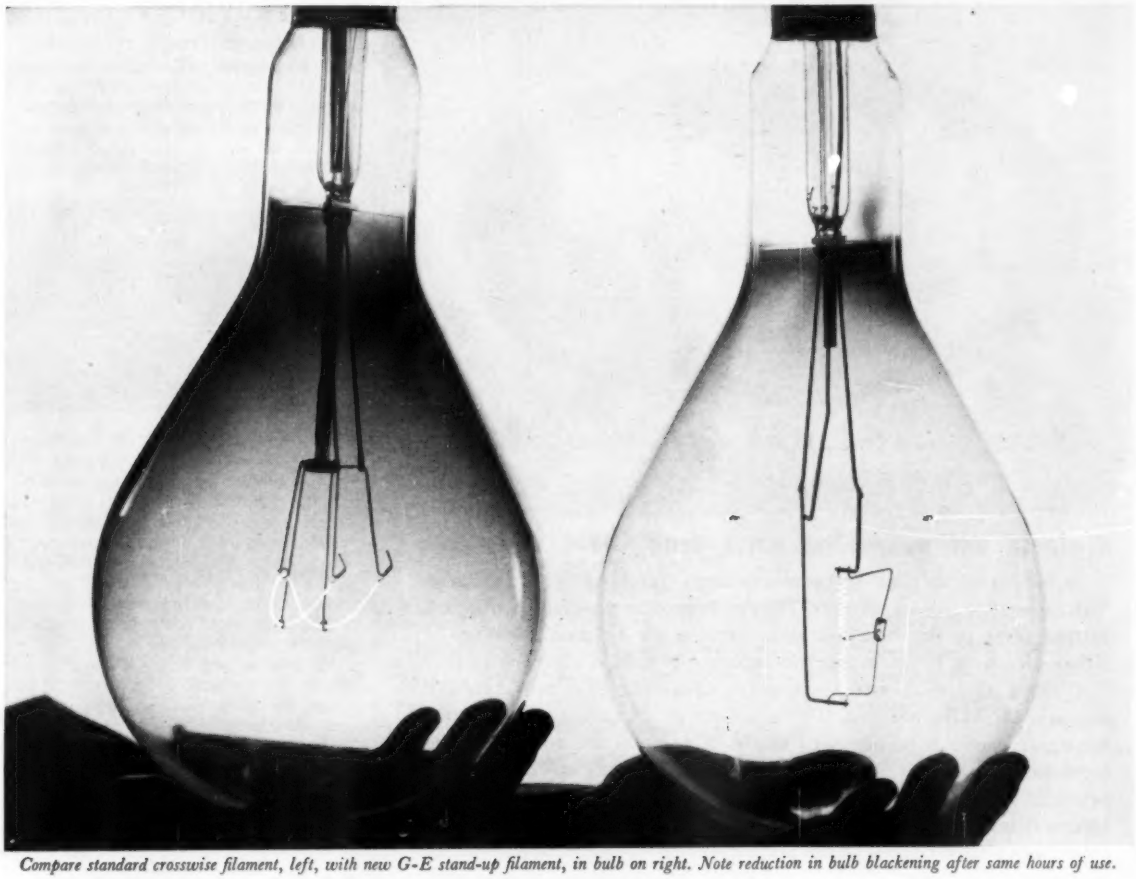
40—VALVE ACTUATOR for electronic control systems

This self-contained electro-hydraulic valve actuator is said to increase advantages and utility of electronic control systems. Application of electronic control systems to industrial processes has been limited by conversion problems and equipment complexities needed to operate

final control element. It is noted that with most electronic control systems, measurements are converted to electrical signals and fed into electronic amplifiers with proportional band, reset and rate actions. The electrical output signal of the electronic controller is then converted to a controlled air pressure which in turn operates a diaphragm actuated control valve. This valve actuator applies the electrical output direct to the final control element. The actuator is described as a self-contained unit including control valve, hydraulic power source, and proportional positioning mechanism which can be used with existing electronic controllers. Outside connections consist of signal wires from the controller and an electric power supply. The signal current is applied to a high-resistance coil (3000 ohms or more) which moves in a magnetic field. Linked to the coil is company's

Announcing: New G-E Bonus Line of lamps, incorporating the most important development in light bulb filaments since 1913!

New G-E discovery uses revolutionary stand-up filament to give you 15% more light from a bulb



Compare standard crosswise filament, left, with new G-E stand-up filament, in bulb on right. Note reduction in bulb blackening after same hours of use.

Promises America a Yearly Light Bonus of Over $100,000,000

General Electric announces the most important development in light bulb filaments in 43 years—a filament that stands on end. It gives up to 15% more light at no increase in cost to you for current consumed.

The 750 and 1000 watt Bonus Line G-E Lamps are available now, at same list price. Other sizes from 60 to 500 watts are being redesigned to use the new stand-up filament

FOUR YEARS OF RESEARCH

At present most light bulb filaments are placed crosswise in the bulb. Four years of intensive research were required to solve the technical problems involved in changing to a vertical position.

The light gain achieved by the new stand-up positioning is a minimum of 6%. The new positioning makes it practical for the first time also to use a specially designed coiled-coil filament in bulbs of 300 watts and over. In these larger bulbs, the two improvements combine to bring the light increase to 15% during the life of the bulb—*extra light worth the entire purchase price of the bulb itself!*

LIGHT INCREASED, BLACKENING REDUCED

The new stand-up filament increases light output in two ways.

First, the hotter a filament burns the more light it gives, and the vertical position allows the filament to burn hotter without burning out any sooner.

Second, the effect of bulb blackening on light output is cut to a minimum. Deposits from the G-E stand-up filament are concentrated in the stem of the bulb when it burns base up, or in a small spot at the opposite end when burned base down. Safely out of the way in either case.

$100,000,000 LIGHT BONUS

The new line of G-E incandescent bulbs incorporating the new filament is called the G-E Bonus Line. The value of the light bonus they will ultimately deliver is estimated at over $100,000,000 a year.

Progress Is Our Most Important Product

GENERAL ELECTRIC

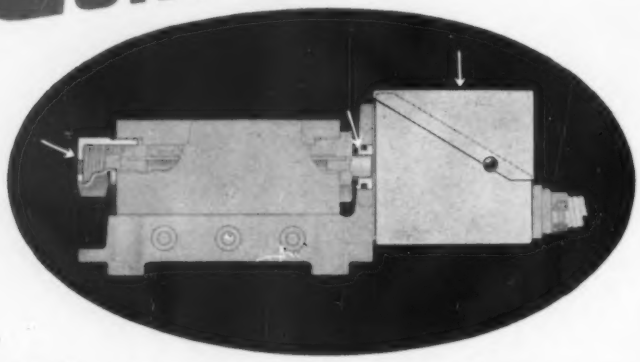
For more facts circle 601 on Reply Card

SELECT

Quick-As-Wink®

AIR AND HYDRAULIC

CONTROL VALVES



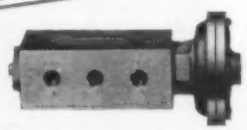
New Dust-Tight Construction

for SOLENOID VALVES

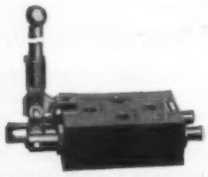
protects all operating parts from Dust and Grit

• Now you can get even greater value in Quick-As-Wink Solenoid Valves — *at no increase in price.* They've been dust proofed. A sintered bronze filter in the breather hole permits air to pass through in either direction, but prevents the entrance of dirt. A sleeve with two "O" rings assures dust-free operation where the solenoid armature contacts the valve plunger. The overlapping cover for the solenoid fits tightly but can be removed easily. It protects the solenoid even from the dust and grit blown around during "cleaning up" operations; provides ample space in which to connect the control wiring to the solenoid leads; and permits the splice to be tucked away inside the cover, not pulled back into the piping. Write for full details — *today!*

Ask us also about . . .



DIAPHRAGM OPERATED "O-TYPE" VALVE, can be actuated with instrument air as low as 12 to 15 psi.



LEVER OPERATED HYDRAULIC VALVE suited for water or hydraulic oils up to 5000 psi. 2-way, 3-way and 4-way actions.

Quick-As-Wink®

AIR AND HYDRAULIC

Control Valves

Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated

Mfd. by C. B. HUNT & SON, INC., 2086 East Pershing St., Salem, Ohio

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 134)

Jet Pipe which converts an electrical signal of less than 50 milliwatts into the stroke of a control valve. The valve moves at a speed of better than 1 in. per second. Thrusts of 600 lb and more can be handled, with strokes available up to 2 in. Askania Regulator Co.

41—HEAVY-DUTY TRACTOR rides on road or track

For use on sidings and other industrial trackage, the new heavy-duty Trackmobile is claimed to pull heavily loaded railroad cars, to switch and spot cars, and to make up strings of cars. It operates on both road and rails, traveling on

roadways or across track on four pneumatic wheels. When astride a track, the Trackmobile's road wheels are retracted and the machine rests on its steel rail wheels, ready for track operation. Conversion from road to rail wheels takes only 90 sec, says company, and the Trackmobile is then ready to travel on the tracks. It can be driven over unimproved tracks, it is noted, and special crossing points are not required.

All controls are in the glass enclosed cab, so the operator doesn't have to get out of the cab to couple or uncouple the cars. A feature of the unit is its ability to double as a tractor for pulling carts and skids about the plant between rail switching jobs. Whiting Corp.

42—PLASTIC TANK holds hot or cold fluids

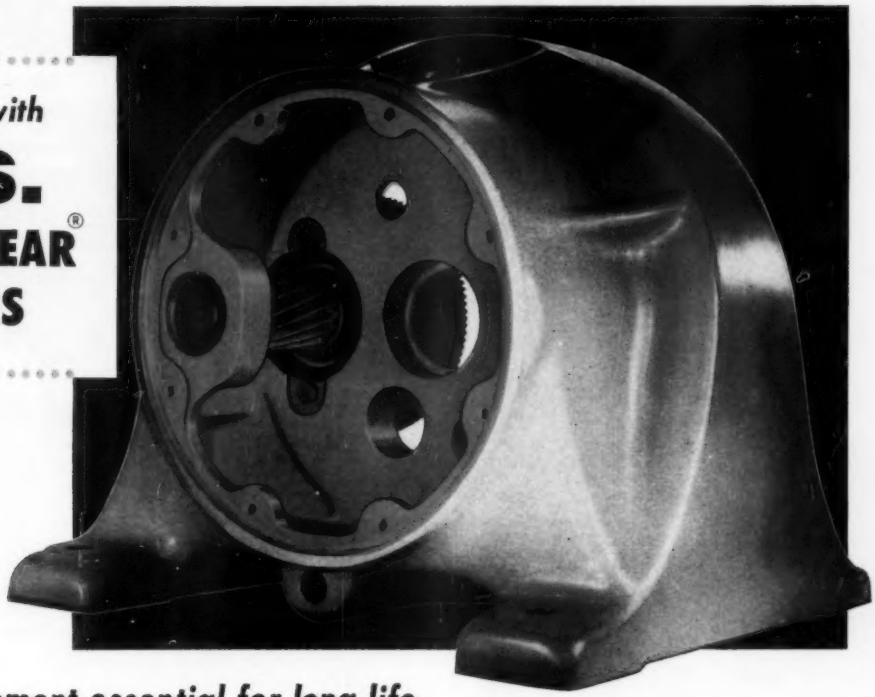
Developed to serve as a portable container for any liquid, hot or cold, is a light but strong insulated plastic tank. It carries 129 gal, weighs 175 lb and sells for around $235. Measuring 31 in. wide, 57⅞ in. long and 21¼ in. deep, the tank is partitioned lengthwise into two compartments, which are crossed by baffles to keep the liquids from surging when the unit is being transported. The hinged partial lid is sealed by Neoprene stripping when closed, and the top can be removed for cleaning.

Interior of this tank consists of fibrous-glass-reinforced Polylite resin made by Reichhold Chemicals, Inc. The exterior is coated with pigmented Polylite to make painting unnecessary. The frame is pressed wood. These tanks find application where fluids must be kept hot yet moved from place to place for use. Outdoor advertising crews use them for keeping paste hot as they move from

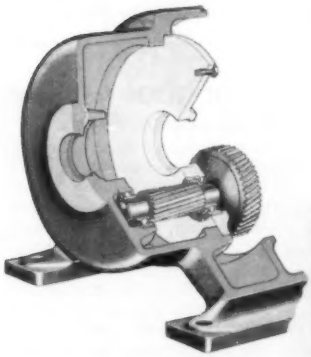
How One Piece Case
Increases Gearmotor Life

Exclusive with

U.S.® SYNCROGEAR® MOTORS

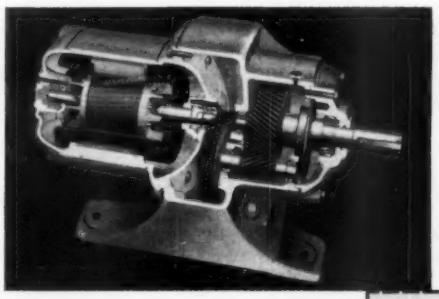


Gear alignment essential for long life



COMMON TWO-PIECE DESIGN MAY MISALIGN!

The U. S. design is a single solid unit which maintains alignment. Both bearings of the countershaft are in the same casting. The bores are therefore absolutely concentric and can never become misaligned, whereas in common units, a two-piece casting is used which may cause misalignment. The rugged U. S. pyramidal gear case gives stronger and more accurate support to the bearings and shaft, insuring permanent alignment for longer trouble-free motor life.



U.S. Features:

- *Solid Shank Built-In Pinion*
- *Asbestos-Protected Windings*
- *Hardened Gear Teeth*
- *Positive Automatic Lubrication*
- *Normalized Castings*
- *Compactness*
- *Dependable, Economical Quiet Operation*
- *Wide Selection of Types and Sizes*

U.S. MOTORS

Mail Coupon for Free Descriptive Multi-color Booklet with all the facts you should know about geared motors.

U. S. ELECTRICAL MOTORS Inc. PLE-12
P.O. Box 2058, Los Angeles 54, Calif., or Milford, Conn.
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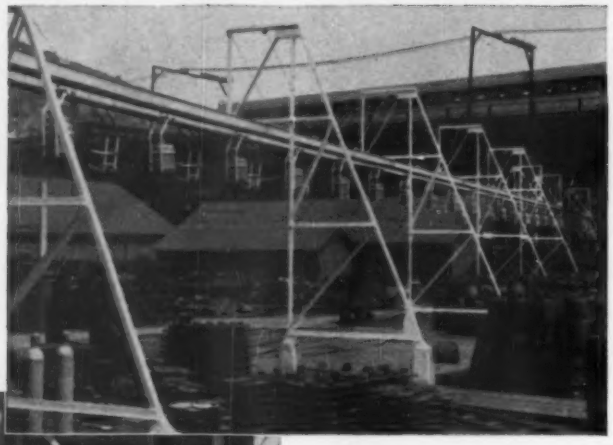
Automation...
A New Word for an Old Idea



This trolley conveyer system with completely automatic receive and discharge stations, has been in the customers service for nearly 20 years, handling air brake reservoirs from foundry to machine shop.

The Engineers in the Conveyer Industry have been working at **Continuous Flow Material Handling** for a long time. The first Mathews equipment, for example, was built over 50 years ago, and although comparatively simple, was applied to do exactly what is expected of today's highly special conveying machinery — to help manufacturers produce more, at less cost.

Call it Automation, Continuous Flow, Technocracy — call it what you will. The results are the same—**more good things for a greater number of people.**

Whatever your product—whether you measure its weight in pounds or tons—if it must be handled, there are Mathews Conveyers to do the job efficiently.

50 YEARS OF MC MECHANIZED HANDLING

MATHEWS CONVEYER COMPANY
GENERAL OFFICES . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV., MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . MATHEWS CONVEYER COMPANY, LTD. PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities
Export Representative—Foreign Trade Division of New York Hanseatic Corporation

For more facts circle 604 on Reply Card

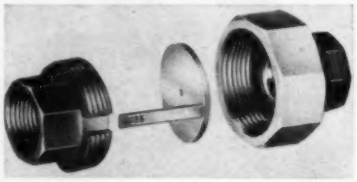
NEW PRODUCTS

(Begins on page 134)

one billboard to another. Calumet Fiberglass Products Co.

43—ORIFICE UNION with plate identification tab

This 3000-lb orifice union for instrumentation and process control piping is said to eliminate errors in plate identification. A recent addition to company's forged



steel fittings, its orifice size is plainly stamped on tab that protrudes through a slot in end piece of union. Tab is an integral part of the stainless steel orifice plate. Orifice plate is easily removed when it is necessary to change flow conditions. Connecting pipes need not be pulled back any further than required to slip plate from between two union ends. Sizes, dimensions, and price information are in Data Sheet SU-1. Watson-Stillman Fittings Div., H. K. Porter Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 181-182.

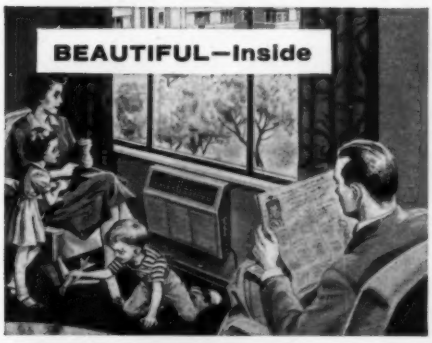
44—CERAMIC TOOL for metal cutting applications

Now in the development stage, Alundum Tool Bits are made of aluminum oxide and their importance to industry is said to lie in the abundance of ceramic materials. Also, ceramic cutting tools may have an added advantage of being less expensive than conventional cutting tools, it is pointed out. Recent machining tests are reported to show superiority in high temperature strength, wear resistance and hardness. And because they can be operated at higher speeds, they are claimed to cut faster, require no coolant and produce excellent surface finish. Also, workpiece and cutting tool remain cool to touch when tool is operated with proper tool geometry and chip breaker adjustment, says company, and due to the heat resistance of the tool, blanks may be shaped by dry grinding with diamond wheels. Norton Co.

45—GASKETING MATERIAL for high temperature use

This gasketing material—Garlock 662—is described as a cork-base paper, impregnated with Chemigum latex, a water-, oil-, and gasoline-resistant latex made by

A NEW CONCEPT IN INDIVIDUAL ROOM AIR CONDITIONING!



All living rooms and bedrooms in the 230 apartments of New York City's smart new Randall House, designed by Boak & Raad architects, feature Airtemp "All-in-Wall" Air Conditioners built right in.

Airtemp installs new "All-in-Wall" units in 420 rooms in new Randall house

AIRTEMP BUILDS AIR CONDITIONING TO FIT ANY REQUIREMENT! Now, for those buildings where a central air conditioning installation does not meet all of your needs . . . Airtemp has developed "All-in-Wall" air conditioning . . . A new concept in individual room cooling. Look at these exclusive "all-in-wall" features:

Quiet! Airtemp engineered for super-quiet operation—no distracting motor noise—inside or out.

Individual Room Control! Each unit can be controlled by the tenant. Automatic thermostat is standard equipment.

Flush Outside! No outside projection to mar the beauty of the building.

Full Window View! Unit is out-of-the-way *under* the window . . . extends only inches into the room.

Full Capacity! Extra-high cooling capacity is engineered by Airtemp to meet the demands of the hottest weather.

Easy Installation! Eliminates expensive on-the-spot engineering costs in new or old buildings.

Easy Maintenance! Inside access plus identical cabinet size for ½, ¾ and 1 H.P. models.

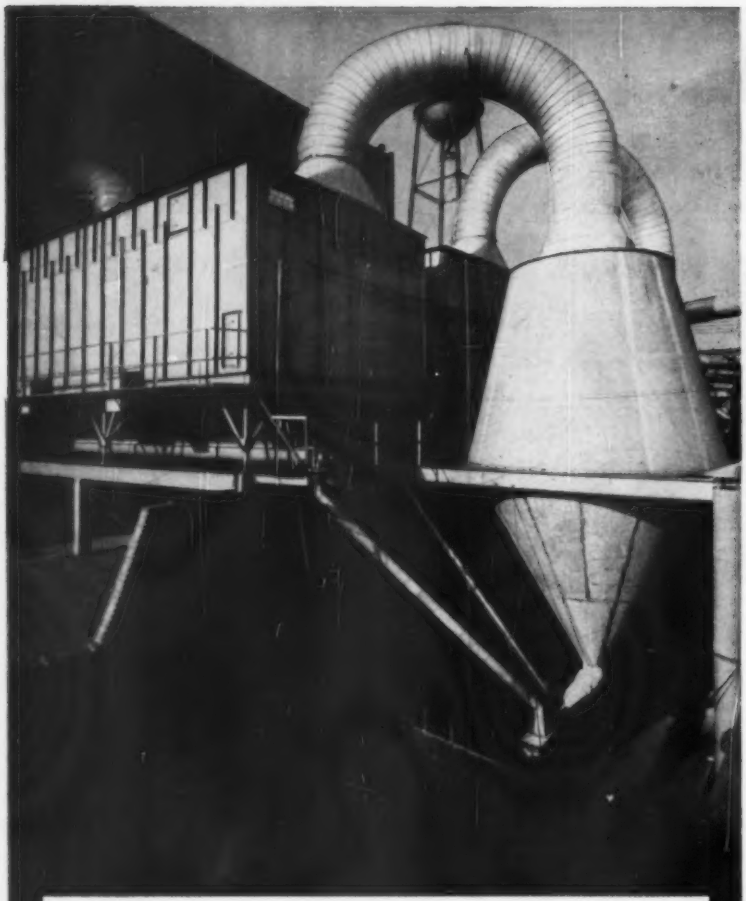
Individual Metering! Each tenant absorbs the cost.

All these services are yours when you air condition with Airtemp . . . The top engineers of Airtemp Construction Corporation—local Airtemp servicemen—plus on the spot personnel equipped to guarantee efficient operation through all the years ahead. Write Airtemp Construction Corporation, Dayton 1, Ohio, for further details.

Airtemp
DIVISION
CHRYSLER CORP

AIR CONDITIONING FOR HOMES • BUSINESS • INDUSTRY

For more facts circle 605 on Reply Card



Dust got their goat at Amalgamated!

Pangborn rids plant of goatskin dust, gets higher production at lower cost.

Processing 25,000 goatskins daily created a serious dust problem for Amalgamated Leather Co., Wilmington, Del. Dust was so thick during the buffing operation that workers had to stop every half hour to clean up. Pangborn Dust Control solved this problem. The atmosphere during buffing is now clean. Workers do better, *continuous* work. Plant and machinery maintenance costs are lower. No wonder Amalgamated says Pangborn is "really doing a job"!

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Maryland.

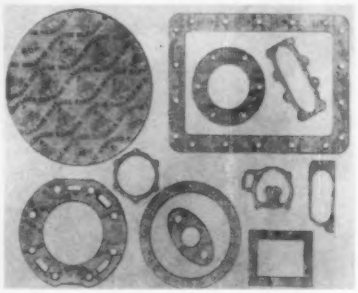
Pangborn
CONTROLS DUST

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 134)

Goodyear Tire & Rubber Co.'s Chemical Div. This latex is claimed to permit use of the gasketing at temperatures to 300 F. Also, the latex binder is not susceptible to changes in moisture content, company says, thus eliminating shrinkage. The non-shrinkage feature lets you cut

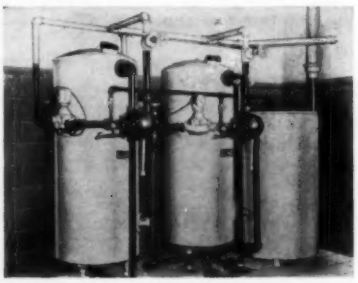


your own gaskets from Garlock 662 sheets in advance, it is pointed out, and storage presents no problem because the Chemigum latex offers superior resistance to humidity, high temperatures and aging.

Although intended primarily for use in the oil and chemical industries, this material is also suggested for automotive gasketing and for equipment used outdoors. Garlock 622 sheets or cut gaskets come in thicknesses from 0.01 to 0.25 in. Cut gaskets are available in a variety of shapes with outside dimensions ranging up to 48 in. Garlock Packing Co.

46—WATER SOFTENERS come as package units

These water softeners are sold as package units, so that only simple connections are needed to fit a unit into a water system. A supply of company's Resin C-300, a high capacity resinous exchange

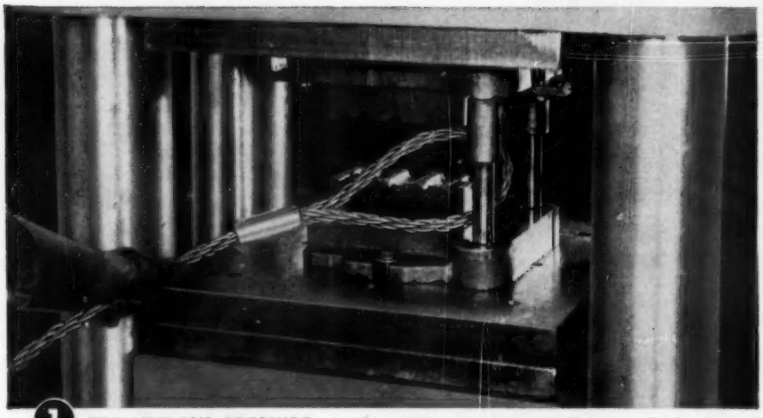


material, is provided. Each unit consists of a brine tank and a softener tank, with their controls and piping in place. Twin units—two softener tanks with a single brine tank—also are available. With a twin, one tank is always on the line to supply soft water while the other is being regenerated. Flow rates can be as high as 175 gpm for a single unit, or 350 for a twin, with capacities between regenerations ranging up to 1,500,000 grains for a single unit. Hagan Corp.

Tuffy® SLING NEWS

Vol. 1 — Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. — No. 2

NEW Tuffy® FERRULE GIVES EYE SPLICE STRENGTH OF Tuffy® SLING FABRIC



1 **TREMENDOUS PRESSURE** of this machine in swaging Tuffy's smooth-edged metal ferrule around the tuck splice virtually flows the metal into the braided fabric interstices.

No Increase in Cost For Smoother, Safer Factory Ferrule Splice

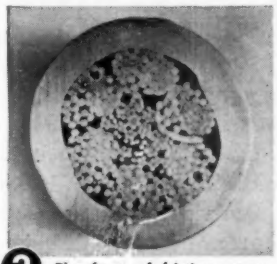
In the most important sling development since Tuffy machine braided wire was introduced, Tuffy now offers sling users greater safety, faster sling handling, and more sling-eye strength—at no increase in price.

It's all made possible by a new steel ferrule used on all Tuffy Slings. This ferrule, slipped over the splice of the eye and pressed on under great pressure, holds so tight that it gives the eye of the sling 100 per cent of the strength of the machine braided wire fabric. The tucked-in splice is completely covered—the swaged ends of the ferrule leave no abrupt edges to catch on loads or to injure workers' hands.

Teamed up with the Tuffy machine braided sling fabric, this new ferrule makes Tuffy the sling handler's favorite for every job.

Good Man To Know— Your Tuffy Distributor

Tell him your requirements. Then let him save you the time, trouble, and money of carrying an inventory. He will stock the Tuffy Slings you want and Tuffy Hoist Lines to team up with your Tuffy Slings.



2 The force of friction set up by compressing the ferrule metal on more of the wire fabric surface forms an eye that really stays spliced.

New Tuffy Sling Handbook FREE — Mail Coupon Now

This big 60-page book tells you all about new factory-fitted Tuffy Slings with our pressed-on ferrule and contains complete information about a full line of factory-fitted Tuffy Slings, nearly a dozen new standard fittings, and complete data and charts on all Tuffy Slings. It also has a brand-new engineer's notebook and a valuable rigger's manual. Send for your copy now. No obligation.

union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

2272 Manchester Avenue, Kansas City 26, Missouri

MY NAME_____ TITLE_____

COMPANY NAME_____

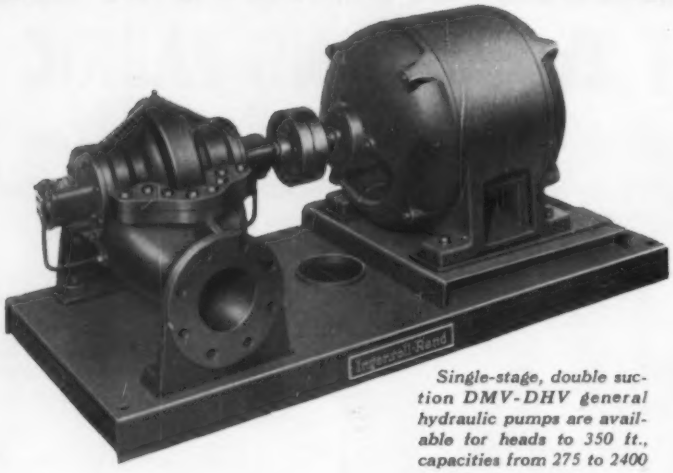
ADDRESS_____

CITY_____ ZONE_____ STATE_____ 13

For more facts circle 607 on Reply Card

HERE'S EXTRA PROTECTION

against pump shaft leakage



Single-stage, double suction DMV-DHV general hydraulic pumps are available for heads to 350 ft., capacities from 275 to 2400 gpm.

Use of double mechanical shaft seals in

DMV-DHV PUMP LINE

ends stuffing box maintenance

This modern DMV-DHV pump *is different!* Gone are the conventional packed stuffing boxes—with their periodic tightening, repacking, and annoying shaft leakage.

Double Mechanical Shaft Seals are standard equipment. Self-adjusting, they require no attention throughout their entire service life. Leakage is effectively prevented.

NO BEARING LUBRICATION

Another advanced design feature of the DMV-DHV pump that helps eliminate maintenance problems is the use of Cartridge-Type Bearings. The lubricant is permanently sealed in. This means successful operation for many years —in tough installations—without any servicing.

Greater Compactness is obtained with this modern construction using mechanical shaft seals and sealed bearings.

Contact your nearest I-R branch office for full details. Or write for Bulletin 7248-A.

Ingersoll-Rand

10-289 Cameron Pump Division
11 Broadway, New York 4, N. Y.

PUMPS • CONDENSERS • TURBO-BLOWERS • COMPRESSORS • ROCK DRILLS
DIESEL & GAS ENGINES • AIR & ELECTRIC TOOLS

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Controlling Obsolescence

(Continued from page 91)

certain other categories of spares are closely watched because of their susceptibility to obsolescence. These include electrical spares. Why? Because as every maintenance man knows, rapid strides are being made in the electrical industry. Redesign of a part can affect its economic use. Redesign can reduce its cost—making older, more costly items "dollar obsolete". So electrical spares are among items often scrutinized, with an eye toward obsolescence—if not numerically, then certainly dollar-wise.

Kaiser's theory put to practice has shown that seldom is it economically advantageous for plant maintenance to buy "for the price break". The risk of overstock is too great. The risk of dollar obsolescence is even greater. The risk of design obsolescence is equally great.

Perhaps Kaiser's system seems complex. In many ways it is. Yet it's applicable to any plant, nor is machine accounting necessary. It is necessary in Kaiser's case, simply because of the variety of the stock. Results have proved the thesis sound.

How Chrysler Solved Modernization Problem

(Continued from page 94)

forms would interfere with production.

So that production personnel could continue to work below the area to be fireproofed, we used a joist type metal decking instead of conventional concrete forms, and fireproofed the underside with a layer of light weight vermiculite plaster. The metal decking we used as a sub-floor had wells 4½ in. deep. From this sub-flooring, we suspended a continuous membrane of metal lath that acted as a base for our plaster fireproofing ,which was applied by machine in a 1-in. layer, giving the floor system a 4-hr fire protective rating.

The combination of movable scaffolding and the use of the plastering machine permitted production to continue uninterrupted. Approximately 300,000 ft of vermiculite plaster was applied in this way to fireproof the ceiling and beams of the building. Three or four of the machines were in use most of the time.

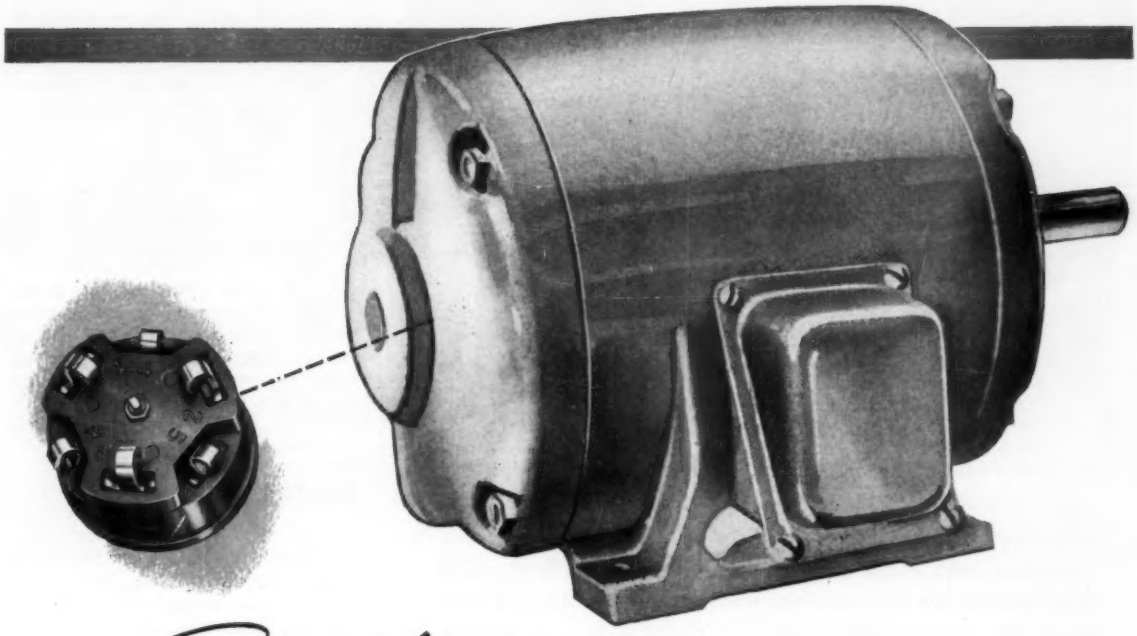
In much the same way, all supporting columns in the building were fireproofed using the metal lath and vermiculite plaster system down to a height of 7 ft. Below that height, heavier fireproofing materials were used to preclude the possibility of me-

IT'S HERE!

3-PHASE

Inherent Motor Burnout Protection

That Allows Full Motor Capacity With Maximum Safety



Specify

3-Phase Motors with Built-in

KLIXON PROTECTORS

In the past, where 3-phase motors have had to rely on remote overload devices, many motor burnouts could be traced to the wrong size heater having been installed to avoid nuisance trips. The machine designer, simply by specifying motors with KLIXON Inherent Protectors, can now be assured that his motors will not burn out, yet will deliver maximum motor capacity.

KLIXON Inherent Motor Protectors provide positive protection against overheating from all running and stalled rotor conditions:

- **Extremely heavy overloads**
- **Single-phasing**
- **Stalling**
- **Failure to start**
- **Lack of ventilation**
- **Increase in ambient temperatures**
- **Plugging or reversing duty**

KLIXON 3-Phase Motor Protectors are available in four sizes — covering a range of horsepower ratings from fractional up through 7½ hp. (600V.), single or dual voltage. Write for Bulletin MOPR-1 which explains inherent motor protection.

KLIXON

Trade Mark Reg. U.S. Pat. Off.

METALS & CONTROLS CORPORATION
SPENCER THERMOSTAT DIVISION

4512 FOREST ST., ATTLEBORO, MASS., U. S. A.

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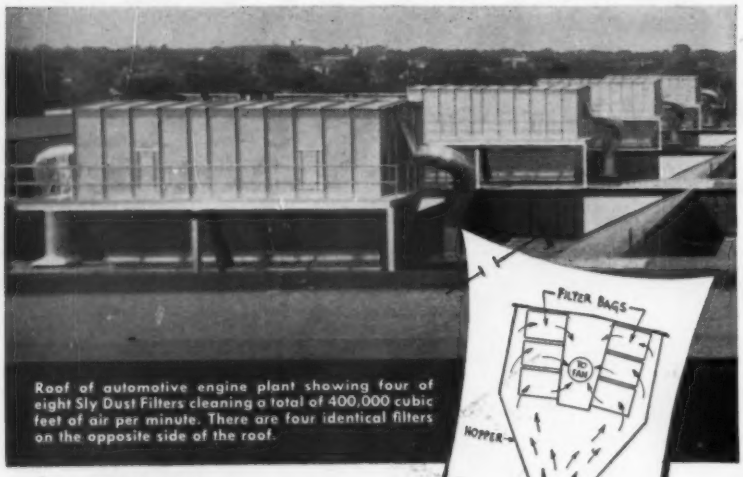
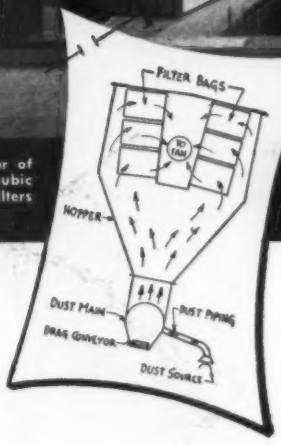
No Matter What You Make or Process,

If There's Dust You Need SLY



Roof of automotive engine plant showing four of eight Sly Dust Filters cleaning a total of 400,000 cubic feet of air per minute. There are four identical filters on the opposite side of the roof.



DUST...

RECLAIMED—
RE-MELTED—
RE-USED

Here are four of the eight Sly Dust Filters which exhaust the dust from milling machines in a large automotive engine plant.

Dust from machining engine blocks and other operations, is exhausted into hoods over the machines, thence into mains and through the hoppers into the filters; the collected dust drops into hoppers thence into the mains and is re-claimed —briquetted, and re-melted.

Aside from the recovery of valuable materials, the use of Sly Dust Filters results in a clean plant and better working conditions.

Because of their larger filtering capacity and easy replacement of bags, Sly Dust Filters offer definite advantages in economy of operation and lower maintenance.

If you will tell us your dust problem we shall be glad to tell you what can be done about it and give you an estimate of cost.

Designers and Manufacturers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

THE W. W. SLY MANUFACTURING CO.

SINCE 1874

4600 TRAIN AVENUE • CLEVELAND 1, OHIO

Visit Our Booth at the CHEMICAL SHOW Philadelphia, Dec. 5

OFFICES IN PRINCIPAL CITIES

PIONEERS AND LEADERS IN INDUSTRIAL DUST CONTROL

For more facts circle 610 on Reply Card

chanical damage to the fireproofing.

This fireproofing system serves us in two ways. If a fire should accidentally start in the paint stock storage area on the first floor, for example, it won't be able to spread into the hazardous area above.

To help carry out our program of fireproof plant construction, we also built several fire curtains around individual painting operations and fireproofed them with vermiculite plaster. These curtains are suspended from the ceiling around paint spray booths and drying ovens to make it impossible for a sudden blaze to sweep through the shop. If a fire occurs in any painting or baking area, the curtains will confine the heat and flames to the area where the blaze originates.

Completing the fireproofing picture, vermiculite was used as an aggregate in concrete for fireproofing beams around openings we made for entrances and conveyors to adjoining buildings. After cuts were made at these points, new beams were put in to support the structure around the cuts. To make sure that these beams are protected from the intense heat they might be subjected to in case of fire in either building, they are encased in vermiculite concrete, using a one to four mix. The vermiculite concrete was machine-applied by Hanna, Zabriske and Daron of Detroit.

Industrial Instruments

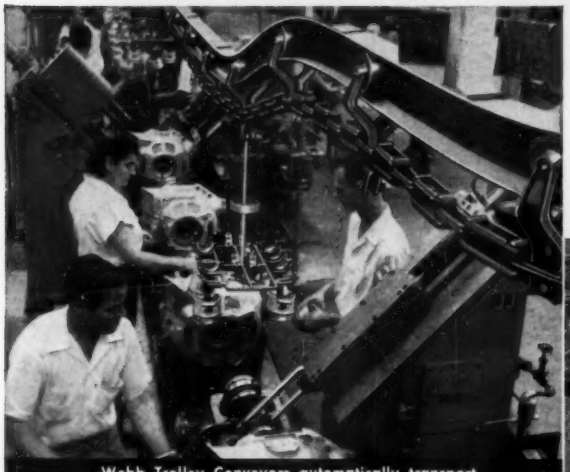
(Continued from page 119)

The work benches in the shop should reflect careful planning around the type of instruments most frequently handled. One set of benches should be primarily designed for electrical instruments with another set especially tailored to suit the needs of pneumatic instruments. Many of the most frequently used testing instruments and devices can be mounted on panels or shelves backing up the work bench. Volt-ohmmeters, variable voltage supplies, oscilloscopes, etc., can be mounted in this fashion on the electrical bench while manometers, test gages, and pressure regulators can be so mounted on the pneumatic test benches. Individual tool and test equipment requirements for individual instrument types will be discussed in the concluding part of this article.

Although the shop is primarily a facility for working on equipment, it must also serve other purposes as the "home" of the instrument department. A library of a few shelves containing references, texts, and manufacturers' service manuals should be available. Some type of simple filing system must be provided for keeping instrument service records.

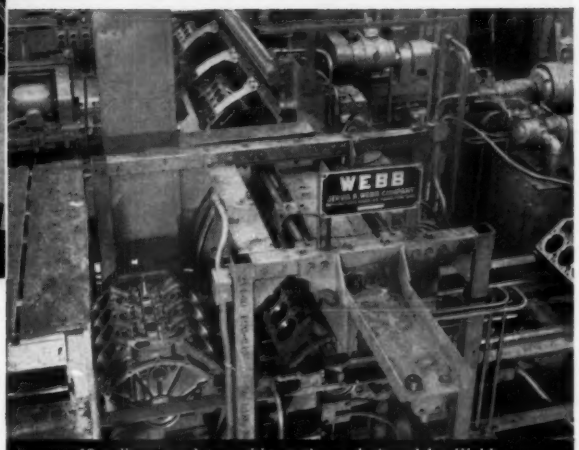
JERVIS B. WEBB

CONVEYOR ENGINEERING, MANUFACTURE, INSTALLATION and AUTOMATION



Webb Trolley Conveyors automatically transport parts and sub-assemblies to final assembly line.

MATERIALS HANDLING...



42 rollover and turntable stations, designed by Webb, index blocks 90° or 180° for machining operations.

Automation at Plymouth

Four miles of Webb Trolley type overhead transport conveyors have given the new Plymouth engine plant a higher degree of efficiency than they have ever had before. In engineering the layout for the new plant, Plymouth's goal was to achieve flexible and continuous production flow with a minimum of manual handling. Webb custom-engineered conveyor systems . . . 26 conveyor lines . . . have provided the answers for Plymouth.

Of particular interest is the high degree of automation designed by Webb engineers into the engine block production line. A Webb two-strand indexing type chain conveyor provides positive flow control for engine block production. Also, Webb engineers designed twenty rollover stations where engine blocks are automatically rotated 90° or 180° on the vertical axis to put them into position for the next machining operation. In addition, twenty-two Webb designed turntables index the blocks 90° on the horizontal axis for another machining operation.

Complicated automatic control systems and the control panels were designed and built by Control Engineering Co., a subsidiary of Jervis B. Webb Co. These control panels furnish a visual check on material flow and the operation of the conveyor systems.

This installation is another example of how manufacturers are turning to Webb conveyor engineers for answers to their materials handling problems. Regardless of your needs—single line conveyor or a complete plant conveyor system — Webb engineering service will provide the economical and efficient answer to your materials handling requirements.

Write to us on your company letterhead and we will be happy to place your name on the Webb mailing list to receive factual technical information on conveyor installations, case history reports, and new product literature.

JERVIS B. WEBB CO.

Specialists in Custom Conveyor Systems

8933 ALPINE AVENUE • DETROIT 4, MICHIGAN

Offices and Representatives Throughout The World • **FACTORIES:** *Detroit* • *Los Angeles* • *Hamilton, Canada*

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How to have clear telephone service... even in the middle of the proverbial "BOILER FACTORY"!

GAI-PHONE (pronounced GUY-phone) *... the wonderful new electronic telephone for noisy areas*

EVER TRY to talk to your chief engineer while he checked meters at a generator? Or to your production manager while your biggest and noisiest machinery ran full-blast? Such a situation *could* be no problem at all, if your man were talking to you on a GAI-PHONE.

This ingenious electronic telephone—using some vacuum tubes, rectifiers and other devices in its special base—actually creates a *Zone of Quiet* around the user's head. His voice comes through clear as a bell, but the extraneous noise is effectively suppressed. What's more, he can adjust *his* telephone so that your conversation is clearer and the annoyance of side-tone is reduced.

Best of all—it's all much less expensive than building soundproof booths or such. Let us tell you more—send coupon today.

STROMBERG-CARLSON COMPANY

A DIVISION OF GENERAL DYNAMICS CORPORATION

Please let us have more information on your GAI-PHONES, for use in noisy areas.

FIRM .....

ADDRESS .....

.....

SIGNED .....

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INDUSTRIAL FILMS

Pipe Threading Machines

PROPER SELECTION and use of portable pipe threading machines, both in the shop and out on the job is shown in a new, sound movie film, in full color. The running time is 20 min.

The Oster Company makes this available on a free, loan basis to organizations such as trade associations, vocational classes, foreman groups, contractors, architects, and engineers.

Reservations should be made with The Oster Manufacturing Company, Cleveland, Ohio well in advance of scheduled meetings.

Submersible Pump

A FILM on the submersible method of pumping, titled "The Submersible Story," is said to be the first factual story of this type of pump—its history and development, construction and operation.

The submersible's progress from early designs to present day applications and installations is shown. Animation is used to illustrate the operation and make graphic the construction and working principles of key submersible parts, including the mechanical and mercury seals.

This film may be obtained for showing by writing to Roger Barron, Submersible Products Manager, Byron Jackson Pumps, P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

On Inert-Gas Arcwelding

A NEW MOTION picture, in full color with sound, has been produced, telling the story of the tungsten inert-gas arcwelding process.

Typical applications of the process show manual, semi-automatic and completely mechanized equipment in use.

This arcwelding process was specifically developed for joining light gages of the so-called "hard-to-weld" metals and alloys: nickel, stainless steel, aluminum, brass, copper, titanium, beryllium alloys, cast iron, Everdur, Inconel, Monel and silver.

Colorful animation explains in detail how the process works.

Titled "Nothing But The Best," and running 20 minutes, the film is suitable for showing to metal fabricators, business groups, and foremen's clubs.

A print of the film may be borrowed from any Air Reduction office or by writing Air Reduction Sales Company, 60 East 42nd Street, New York 17, New York.

Busway with Alcoa Aluminum Bus Bar

COSTS LESS,

SIMPLIFIES DESIGNS,

PACKS MORE POWER!

Westinghouse
Bus Duct being fabricated
at its Beaver, Pennsylvania, plant.

This new aluminum busway with Alcoa® *Aluminum* Bus Bar is one-third lighter than copper busway of equal conductivity. It has greater current-carrying capacity, pound for pound, than cable in conduit. It is prefabricated in standard sections . . . installs easily and quickly in any layout.

Alcoa's new No. 2 EC aluminum bus bar was developed to meet the demands of distribution bus for superior properties. It provides the most favorable combination of strength, conductivity, low creep and light weight at a significant saving in cost.

Wherever your production requirements demand an efficient, flexible electrical distribution system, specify busway with Alcoa Aluminum Bus Bar. Aluminum Company of America, 2301-M Alcoa Bldg., Pittsburgh 19, Pennsylvania.

Your Guide to
Aluminum Value

BUS BAR MADE OF
ALCOA®
ALUMINUM
ALUMINUM COMPANY OF AMERICA
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ALWAYS USE ALCOA® ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

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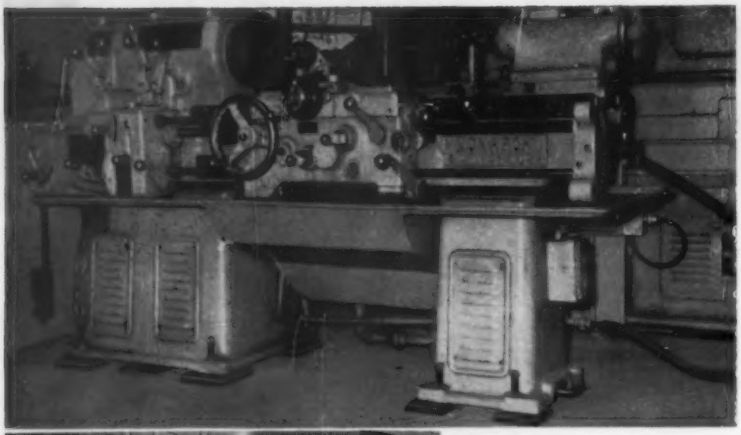

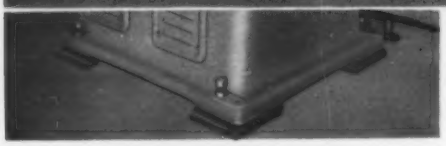

Precision lathe mounted on new Type "T" UNISORB. Bottom photo shows close-up of machine base and use of UNISORB with leveling screws and steel plates.

New Type "T" UNISORB® Mounting Pads Used for Precision Machines...

For precision machines which must remain extremely level during operation, Type "T" UNISORB is now available. Like other types of UNISORB, this type reduces transmitted vibration and is used without bolting machines to the floor.

Condensed information about new Type "T" UNISORB Mounting Pads

Loading: carries loads of 75 to 125 lbs. per sq. in.

Thickness: ⅜" thick material with a greater density and firmness than other types of UNISORB.

Uses: include mounting of precision lathes, grinders, planers, jig borers, etc.

Resistant to petroleum products, mild acids and plant water conditions, Type "T" UNISORB provides a firm and durable mounting.

For the complete story about this new product and other types of UNISORB Mounting Pads, return the coupon today.

The **FELTERS** Co.

225 SOUTH STREET, BOSTON 11, MASS.

"FELT FOR EVERY USE"

RETURN COUPON NOW! Please send information about Type "T" UNISORB and the booklet "Facts About Anchoring Your Machines with UNISORB".

Name..... Title.....
(Please Print)

Company.....

Address.....

City..... Zone..... State.....

Return to: The Felters Co., 225 South St., Boston 11, Mass.

For more facts circle 614 on Reply Card

NEW BOOKS

for the plant engineer

Materials Round-up

HANDBOOK OF ENGINEERING MATERIALS—D. F. Miner and J. B. Seastone, editors. Size 8½ by 5¾ in.; approx 1380 pp; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $17.50.

ENGINEERS ARE NATURALLY expected to be able to specify materials in the course of their work. This may involve design, construction or repairs. Sometimes pertinent information is not easy to find; a number of references may have to be consulted in the search.

In this book, there is a useful roundup of information on many materials; this concentration in one source should be advantageous. The level at which the book is presented calls for a knowledge of engineering principles on the part of the user.

The book is composed of four main sections. The first part contains general information on materials. This includes a number of mathematical and unit-conversion tables as well as some on physical properties. The second portion is devoted to metals. Next, is the section on non-metals and this includes such materials as fibers, plastics, fuels, industrial chemicals and lubricants.

The final division is given to construction materials. Among the subjects that are considered are the following: concrete, timber, fiber and wire rope, foundations and glass products.

Power Systems

INDUSTRIAL POWER SYSTEMS HANDBOOK—Donald Beeman, editor. Size 9¼ by 6½ in.; 971 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y. Price $12.50.

SIZEWISE AND INFORMATIONWISE, this is a big book. It packs a great deal of material that pertains to the electrical characteristics of a plant. This is not a basic work and a knowledge of electrical engineering principles is presupposed in prospective users of this book.

One important item that is given a good bit of attention in this volume is grounding; this concerns both systems and equipment. Another subject that is covered extensively is overcurrent protection such as various sorts of relays, current-limiting and standard fuses, and direct-acting trip

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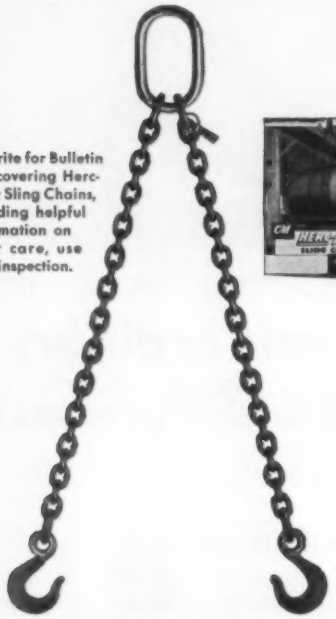

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devices. The book also contains several case histories on coordination of protective devices.

Among other topics covered in this handbook are the following: power-factor improvement, secondary distribution systems, selection of system voltages, load center power systems and circuit arrangements, and modernization and expansion of existing systems.

Building Tips

BUILDING PLANNING AND DESIGN STANDARDS by Harold R. Sleeper. Size 11¾ by 9⅝ in.; illustrated; 331 pp; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $12.00.

THIS BOOK presents a great deal of helpful and time-saving material on sizing, detailing, and layout of architectural work. The information ranges from that on small homes to mechanical equipment for commercial buildings.

For an idea what one main division of twenty-three sections in the book has to offer, a portion of the topics on office buildings is presented. This includes: functional relationships, site and financial considerations, floor heights, bay spacing, office clearances, movable partitions and office furniture.

It might be well to mention that the part of the book on mechanical equipment pertains mainly to elevators and escalators. There is also some information on pneumatic tubes in addition to some tables on plumbing fixture requirements.

Engineering Terms Defined

DICTIONARY OF MECHANICAL Engineering Terms. Size 7½ by 5¼ in.; 417 pp; cloth bound. Published by Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. Price $6.50.

THE SEVENTH EDITION of this book contains an extensive listing of words and expressions used by engineering people. It is a publication that originated in Great Britain. Therefore, some of the terms that appear in the book are not in common usage in this country. However, there are others that are used interchangeably in the two countries.

There are two divisions in the book; the first contains modern terms. Some of the definitions in this section do not pertain strictly to Mechanical Engineering work; however, they are terms that might confront a mechanical engineer in the course of his work. General terms and ones that could be considered to have a traditional nature are presented in the second and larger section of the book.

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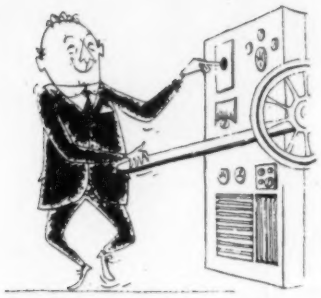

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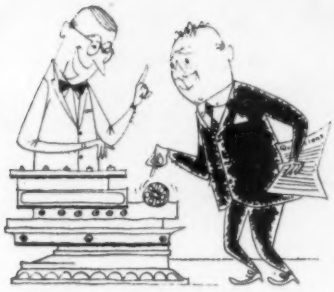

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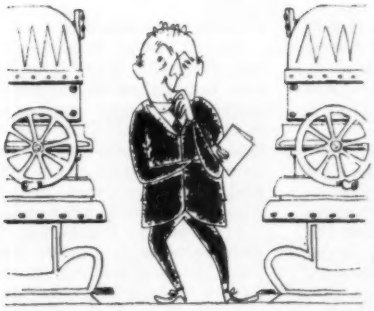

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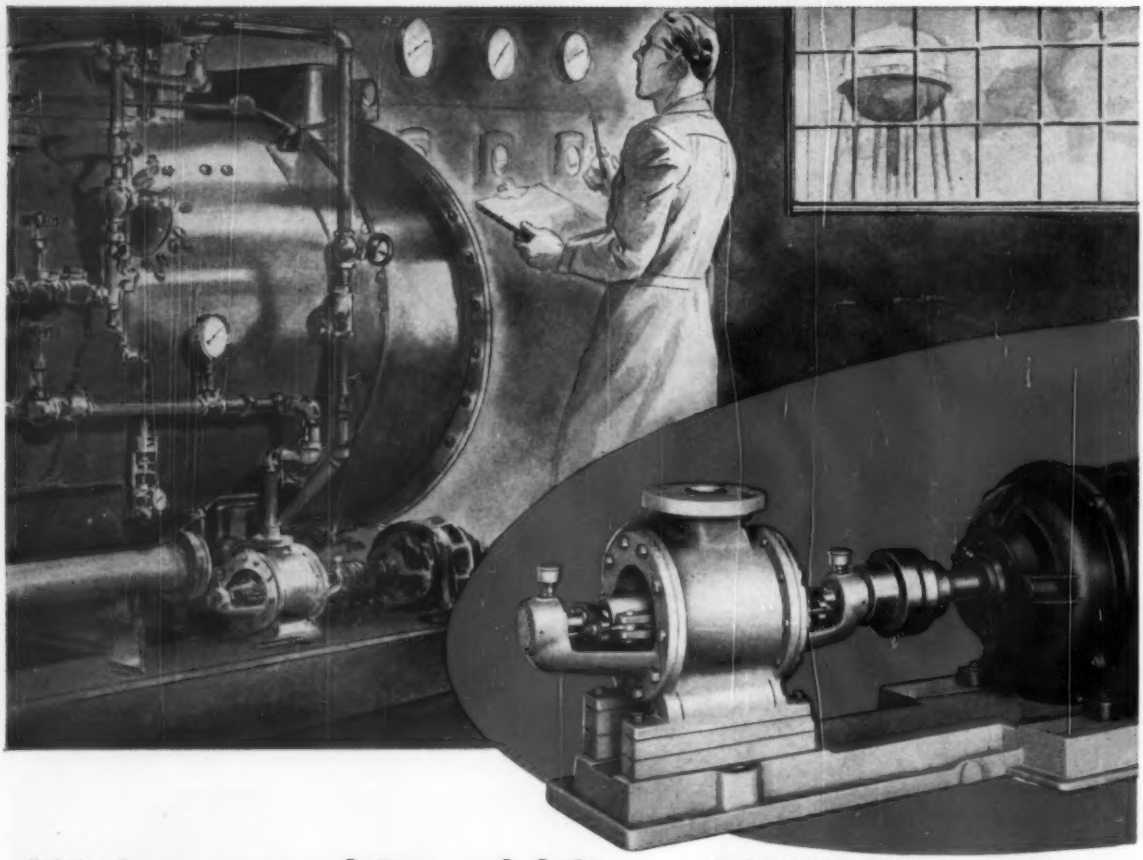

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BULLETINS

(Begins on page 21)

160 **Electric Resistance Welding**—Twelve-pp Bulletin 333 on electric resistance welding, is divided into sections on industrial applications; manufacture and service; principles of operation; and types of machines. Three application stories involving mild steel, stainless steel and aluminum are described—each with its own fabricating problem and its solution using company's equipment. Design, engineering, fabrication, testing, service, installation and maintenance are among subjects covered, and specifications are included. Sciaky Bros., Inc.

161 **Carbon-Dioxide Welding**—This 12-pp article deals with supply methods and flow characteristics of carbon dioxide; the chemical activity of carbon dioxide, properties of weld metal, operating characteristics and specific applications. Air Reduction Sales Co.

162 **Gas Cutting Machine**—Operating advantages of the Oxygraph gas cutting machine are discussed in 12-pp Catalog 804B. Describes four types of tracers for use with the unit—electronic, manual, magnetic and spindle tracers. Includes data on accessories such as tracer motors, speed control units. Air Reduction Sales Co., Div. Air Reduction Co., Inc.

163 **For Precision Grinding**—"How to Select Grinding Wheels for Precision Grinding, Tool and Construction Steels," is the title of this 22-pp booklet. Consisting of three articles, booklet discusses method of selecting grinding wheels for tool steels based on a classification of the steels in terms of their grinding characteristics. Norton Co.

164 **Cemented Carbide Blanks**—Specifications and prices for company's standard cemented carbide blanks for stone cutting tools are given in this 20-pp catalog, Form ST-100. Also includes information on masonry drills as well as grinding procedure for resharpening carbides. Carboloy Dept., General Electric Co.

METALS, METAL PRODUCTS

165 **Ductile Iron**—Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

166 **Hardness Converson**—This chart shows approximate relation between hardness by various testing systems and tensile strength of carbon and alloy steels. Hardness systems covered are Brinnell, Monotron, Vickers, and Rockwell. The Babcock & Wilcox Co.

167 **Metal Products**—New extrusion items are offered in the 20-pp revised edition of this product directory—seamless beryllium copper tubing in redraw sizes and shapes not previously available in commercial quantities—as well as extruded rod and bar stock. Directory gives characteristics of beryllium copper, beryllium aluminum and beryllium nickel alloys; of beryllium metal and oxide; of beryllium copper alloys and others. The Beryllium Corp.

168 **Seamless, Welded Tubing**—This 8-pp catalog describes major classifications of carbon and alloy steel tubing; mechanical, pressure, airframe and aircraft mechanical. Entitled "Ostuco Tubing," catalog covers both seamless and electric resistance welding tubing, as well as tube fabricating and forging. Ohio Seamless Tube Div., Copperweld Steel Co.

169 **Cold Drawn Tubing**—Form AD189 describes company's cold drawn Electricweld tubing with the mirror-like inside finish. Discusses manufacturing process, lists applications and includes specifications. Electricweld Tube Div., Jones & Laughlin Steel Corp.

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AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

170 **Solvent Recovery**—Form 441OD, 36-pp, on company's carbon system of solvent recovery gives technical data on activated carbon and describes efficiency and economy of recovering solvent vapors in a variety of industries. Describes equipment and applications and includes photos and graphs showing resistance to air flow. Also lists lower explosive limits of various solvents and a selection of available literature. Carbide and Carbon Chemicals Co., Div. Union Carbide and Carbon Corp.

171 **Handbook of Hydraulic Tables**—Bulletin 50 is a 28-pp handbook of hydraulic tables and engineering data. Covers accumulators, boiler feed, cylinder capacities, circumferences and areas of circles, conversion tables, displacement per stroke, equivalents, electrical formulae, friction loss, water pounds per gallon vs temperature, recommended materials, pressure, temperature conversion, other facts—all in convenient tabulated form. The Aldrich Pump Co.

172 **Need Engineering Aid?**—"Guide for Selecting an Engineering Firm" is a 20-pp brochure for plant engineers contemplating new product fields, automation, modernization, expansion. Differentiates between engineering installation firm, project engineering firm and engineering design firm. Sketches criteria for determining whether present engineering staff is adequate for job, and outlines guide posts for selecting outside help. Discusses what can be expected from the engineering firm hired. Also describes company's services and cites some jobs performed. The Teller Co.

180 **Motive Power Batteries**—This 48-pp general service manual on lead acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods including safety practices, acid handling precautions, and correct charging methods. Manual is cross-indexed and includes suggested list of spare parts. C & D Batteries, Inc.

181 **Reinforced Roofs**—Bulletin 12-B-1, 32 pp, contains technical data and specifications for installation of Fiberglas built-up roofs. Describes various application techniques for Fiberglas Perma-Ply No. 6, a porous mat of strong glass fibers used to reinforce bitumen on roofs. Sections of this practical booklet are devoted to asphalt roof specifications, coal tar pitch specifications, flashing specifications, insulation specifications and cold emulsion resurfacing specification. Included are 23 illustrations and charts. Owens-Corning Fiberglas Corp.

METAL FINISHING

173 **Metal Finishing Folder**—This three-part utility folder, on metal finishing and plating, can be used for three purposes; as a stock record to help check finishing supplies inventory, an emergency first aid wall chart outlining treatment for plating room accidents, and as a folder to file technical bulletins. Frederic B. Stevens, Inc.

174 **Metal Cleaning Suggestions**—Bulletin 10,000-G, 32-pp, tells how to select proper method, machine and material for metal cleaning, degreasing, decarbonizing, washing, bonderizing, stripping, drying, rust proofing, pickling, coating, other operations. Stresses need for correct cleaning and explains how to analyze cleaning problems. Photos show installations. Magnus Chemical Co., Inc.

MAINTENANCE

175 **Roof Coating**—Form F-100, 12-pp, includes detailed application instructions for putting on a new cold-applied built-up roof. Gives application instructions and materials required for taking care of almost any type of roof or damp-proofing problem. Includes specifications for built-up construction on wood sheathing and on concrete deck. Gerwin Industries, Inc.

176 **Zinc and Corrosion**—"How Zinc Controls Corrosion," 32-pp, describes the many ways zinc lengthens life of steel products, and reduces maintenance costs. Drawings, charts, and photos together with brief comments present corrosion control characteristics of zinc coating, zinc pigments, and zinc galvanic anodes. American Zinc Institute, Inc.

177 **Nature of Wood Floors**—Edition 3 in this organization's Modern Sanitation Methods series of posters highlights causes and methods of treatment of common wood floor problems. Discusses "thirsty" state of wood floors, need for protection from staining by spillage and normal traffic. Shows how proper sealing procedures keep out liquids and strengthen flooring. National Sanitary Supply Ass'n.

178 **Repairing Concrete Floors**—A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. Strength comparisons between plain mortar and non-shrink pre-mixed mortar are given. The Master Builders Co.

179 **To Control Corrosion**—"Corrosion the Thief of Industry" stresses three steps required for adequate corrosion control—analysis, specification and application. Photos show equipment protected against corrosion by means of plastic coating, metallizing, linings etc. Metal-Cladding, Inc.

CONSTRUCTION

182 **Longspan Steel Joists**—The advantages of company's line of longspan steel joists are outlined in this illustrated 12-pp bulletin. Specifications are included as well as a standard loading table. Also covers their Tri-Rib steel roof deck, special type trusses, skylights. Carew Steel Co.

183 **Fiberglas Panels**—Folder IC-95 describes company's flat panes and corrugated translucent fiber glass panels for varied industrial use. Contains information on first scientifically engineered fiberglas flat panes for glazing, with suggested construction details for metal-covered buildings and double-pitched skylights. Illustrations show typical industrial installations. Alsynite Co. of America.

184 **Aluminum Windows**—This 28-pp catalog contains up-to-date information on aluminum projected window designs and curtain wall systems. Details presented are said to represent some of the most advanced thinking on curtain walls. Generously illustrated with photos and drawings, booklet gives specifications, dimensional data and installation details. The William Bayley Co.

185 **Shatterproof Panes**—Bulletin 532 describes use of company's shatterproof flat panes for sash glazing. Illustrated instructions for installing panes, as well as specifications and installation photos are included. Resolite Corp.

VENTILATION, DUST AND FUME CONTROL

186 **Plant Ventilation**—This bulletin describes company's line of industrial plant ventilators, giving dimensions, capacities, sectional drawings and operating conditions for power roof, continuous ridge, and round gravity ventilators that meet all exhaust and ventilating conditions. American Steel Band Co.

187 **Dust Control Tips**—Bulletin 636-3 offers practical engineering information on Dustkop industrial dust control, its installation, operation and maintenance. It tells how to figure your own system, how to build your own hoods and how to select the right dust collector for the job, and includes drawings you can use. Also pictures a wide range of models for various application requirements. Aget Mfg. Co.

BULLETINS

(Begins on page 21)

188 Industrial Ventilation—Bulletin 6514 describes company's Model K ventura fans for industrial heavy duty exhaust applications. Outlines construction features and explains their significance. Performance data such as delivery ratings at various static pressures, fan speed, motor horsepower, quietness rating and maximum net weight are given for each of 45 different direct-drive units available. American Blower Corp.

189 Ventilation Systems—Engineering data on company's corrosion-proof ventilating and exhaust systems is presented in this 8-pp bulletin. Describes design, fabrication and installation of ducting and fittings, fans and blowers, hoods, and weather caps made of polyethylene. Diagrams illustrate construction features, and specifications are included. American Agile Corp.

190 Furnace Fume Control—The subject of controlling dust and fume produced by electric steel melting furnaces is treated in this bulletin. Includes a discussion on use of local exhaust ventilation and cloth filter collectors, and photos of actual installations. Atmospheric conditions are compared before and after installation of fume control equipment. American Wheelabrator & Equipment Corp.

PLASTICS

191 Plastic and Resins—Latest information on company's plastics and resins is presented in this 12-pp revised 1956 condensed reference file. Summarizes technical data on special and general-purpose phenolic, vinyl, styrene, polyethylene, fluorothene, polyester, silicone and epoxy plastics and resins, and Krene film and sheeting. More than 50 plastics and resins are described under the headings: molding materials, extrusion materials, laminating materials, bonding materials, protective coating resins, flexible film and sheeting, and plastic rigid sheets, others. Bakelite Co., Div., Union Carbide and Carbon Corp.

192 Corrosion Resistant Equipment—Catalog C-12, 32-pp, deserибes a line of corrosion resistant industrial equipment and features some new materials of construction. Evaluates equipment molded from polyvinyl chloride, epoxy glass and polyester glass, giving data on their resistance to chemicals and heat. Includes information on cements, and on mortars for brick and tile. Rating data for exhaust fans, a new method of fitting pipe on the job, and a revised chemical resistance table are included. Haveg Corp.

193 Nylon For Maintenance—Nylon as a maintenance material for mechanical, chemical and electrical applications is described in this illustrated folder. Advantages are given, and specific uses listed along with a lineup of material's maintenance properties. Stock shapes and sizes are shown and finished parts illustrated. Tips on machining are offered. The Polymer Corp. of Pennsylvania.

LUBRICANTS

194 "Fringe Area" Lubrication—Revised Bulletin 103A lists 17 types of molybdenum disulfide lubricants and features an explanation, with diagrams, of applications in extreme bearing pressure, and high, low and normal temperature lubrication. Five new lubricants are included. A selector chart describes each type, kind of carrier used in it, temperature range in which it operates best, and method of application. The Alpha Molykote Corp.

195 Waxes, Oils, Greases—Chemical structure, specifications, properties, applications and general description of a new group of fluorocarbon oils, waxes and greases for industrial use are given in this 16-pp booklet. Among applications suggested are hydraulic pumps, pump fluids, damping fluids, heat transfer media, permanent lubricants. Booklet also discusses color and clarity, viscosity, specific gravity, surface tension, flammability. Chemical Mfg. Div., The M. W. Kellogg Co.

OTHER EQUIPMENT

196 Products and Services—Bulletin GSP-901, 32-pp, summarizes products and services of this company and three subsidiaries. Covers those of parent company which engineers instrument and control systems; a subsidiary which manufacturers water conditioning chemicals and detergents; those of another which markets chemicals for water treatment and maintains a consulting service; and another which serves as a consultant on procurement, treatment, use and disposal of industrial water. Hagan Corp.

197 Tubing Supports—Features and advantages of company's line of tubing supports are discussed in 16-pp Bulletin 955-D. Installation diagrams illustrate straight sections, connectors, extension connector, drive rails, connector fittings, offset reducer connector, fittings, covers, raceway, fastening devices, hangers. Specifications are included. P-W Industries, Inc.

198 Vibration Control—Bulletin F2A shows how to write complete, correct vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

199 Permanent Magnetic Drums—Six-pp Bulletin MD-200 describes permanent magnetic drum applications in the processing of foods, feeds, seeds, grains, chemicals, minerals, sand, coal, cement, slag, and ore. Shows how drums automatically and economically remove tramp iron or ferrous material from gravity or conveyor transported products. Includes diagrams, performance data, application guides. The Homer Mfg. Co., Inc.

200 Woven Wire Products—Woven wire conveyor belts, industrial wire cloth, special metal fabrication, and woven wire slings are described in Bulletin 111. Photos illustrate some typical installations. The Cambridge Wire Cloth Co.

201 Tank Venting Fundamentals—Principles of venting flammable liquid storage and process tanks for effective operation, fire protection and low-cost maintenance are described in this 12-pp illustrated booklet. Explains

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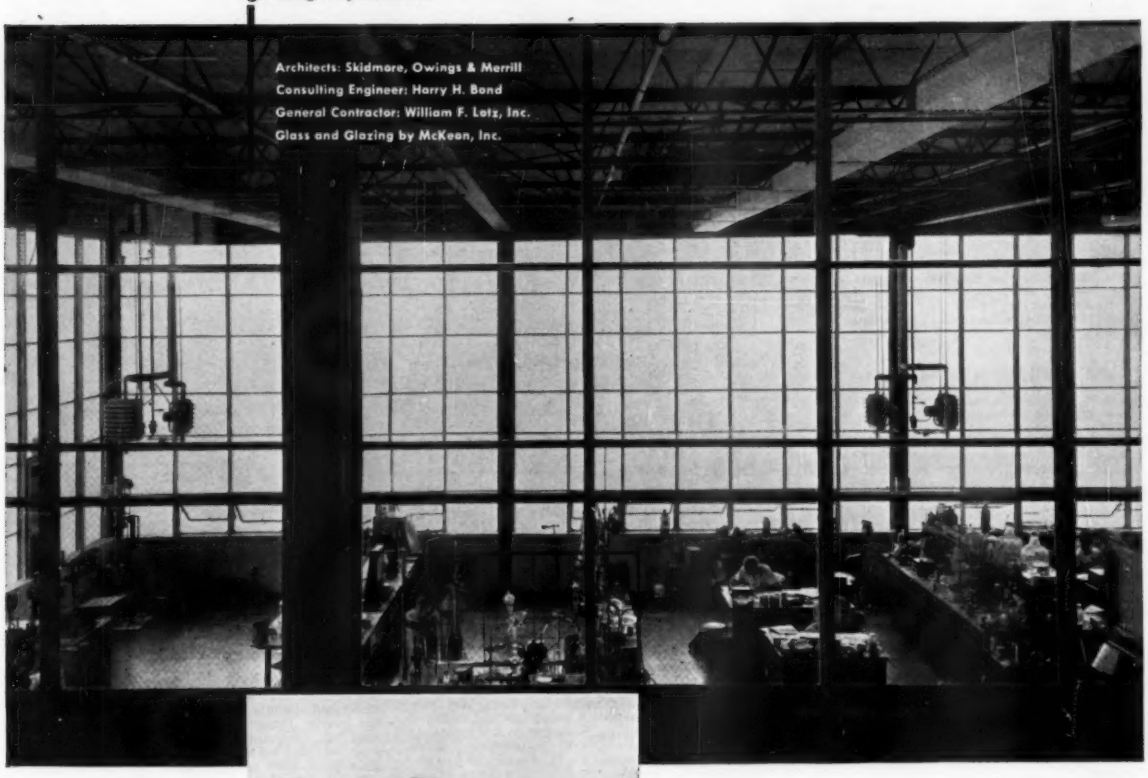

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BULLETINS

(Begins on page 21)

principles as applied to non-conservation venting and conservation venting, storage tank filling, storage tank rodding and sampling, steam tracing. The Protectoseal Co.

202 **Industrial Tapes**—Properties, specifications and application data on pressure-sensitive tapes are given in this profusely illustrated 28-pp bulletin. In text, table and illustration, it covers industrial applications such as strapping, masking, electrical, textile, freezer, drafting and general purpose uses. Includes tips on how to determine tape quality, and how to specify proper tape for job. Includes data on tensile strength per inch of width, elongation in per cent, adhesion per unit of width, and thickness in mils. Behr-Manning, Div. of Norton Co.

203 **Stainless Steel Fastenings**—Catalog 55A, 24-pp, features stainless steel fastenings available from stock, including cap screws, nuts, washers, machine screws, sheet metal screws, wood screws, set screws, and pipe fittings. All are shown with diagrams and charts to facilitate ordering. Piano hinges, wire baskets, shovels, scoops are also described. Standard stainless steel specifications and corrosion resistance tables are included. Star Stainless Screw Co.

204 **Equipment For Industry**—Bulletin SB-14-5M, 32-pp, features industrial furnaces and heavy material handling equipment. Indexed for easy reference, booklet contains descriptive and technical information on product applications. Discusses types of heating and heat treating furnaces, and special mechanical equipment such as forging manipulator, clay guns, butterfly valves and single hook grab buckets. Also illustrates a water purification system. Salem-Brosius, Inc.

205 **Heat Transfer Equipment**—Dimensions, data and capacities for easy selection of more commonly used types of heat transfer equipment are provided in 12-pp Bulletin 31. Covers converters, water heaters, condensate coolers. Buxton Mfg. Co.

206 **Metal Coating Oil**—Technical Bulletin 42 features an anti-rust coating oil for improved low-cost protection of sheet and strip steel and ferrous castings. Tells how it works and how to apply it. Sun Oil Co.

207 **Dehydrator - Filter**—Bulletin M-7155 features a moisture-vapor content chart which enables evaluation of the water vapor in a compressed air system. Describes company's M-series Condensifilters, equipment for dehydration and filtration of compressed air. Hankison Corp.

208 **Metalworking Presses**—Bulletin 3201, 12-pp, illustrates and describes company's line of metalworking presses for extrusion, metal forming and drawing, forging, bending, flanging, crimping and straightening, and pipe fabricating equipment. Explains range of applications with typical installation illustrations and individual tables of specifications. Also included is a table showing capacities for press rams from 1 in. to 60 in. in diameter at various hydraulic pressures, other data. Baldwin-Lima-Hamilton Corp.

209 **Three-Dimensional Cams**—Form 455 describes the evolution of three-dimensional cams from theory to working finished product. Featured are illustrations indicating the infinite number of stations possible on these cams. Parker Stamp Works, Inc.

210 **Temperature Measurement**—A new edition of this popular 8-pp booklet on how temperatures are measured is now available. Defines temperature and discusses development of temperature scales. Temperature effects are listed; and brief chapters are devoted to temperature measurement by thermometers and pyrometers, by color, and by chemical signal. Tempil Corp.

211 **Identification Guide**—The story of modern identification methods, and a description of several dozen materials comparatively new in industrial communications, comprise the contents of this 8-pp brochure. All materials described are pressure-sensitive self-adhesive, ranging from roll form tapes of paper, cellophane, acetate and cloth, through sheet and roll form die-cut pick-offs, to metal nameplates. Topflight Corp.

212 **Mechanical Seals**—Technical information, including sectional drawings and diagrams, on mechanical seals is presented in 12-pp Bulletin AD-151. Describes chief design and construction features and includes general recommended service data. Lists seal parts and their functions and gives installation tips. The Garlock Packing Co.

213 **Electrical Safety Markers**—Bulletin 175 describes and pictures a line of self-sticking non-conductive conduit and voltage markers. Shows styles available, and provides photos of these markers in use for identifying conduits, busways, circuit breakers, control centers, switches, power lines. W. H. Brady Co.

214 **Structural Polyethylene**—"Plastics For Chemical Engineering Construction—Polyethylene" details molecular structure of polyethylene and discusses its mechanical, electrical and chemical properties and characteristics. Illustrates typical fabrications and applications of the plastic. Tables indicate typical properties, and a chart presents weights per foot of seamless centrifugally cast tubing. American Agile Corp.

215 **Water Coolers**—Form 4-C describes and illustrates company's new line of electric water coolers, featuring dual hand and foot controls, thermostatic protection for storage system, thermostatic control of water temperature and up to 30 per cent increase in water capacity. Photos, cooler selection table, capacities and special features are given. Cordley & Hayes.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 181-182.

CONSTRUCTION

301 **Aluminum in Architecture**—This 32-pp booklet provides information on use of aluminum, and of special interest is a discussion on architectural colors for aluminum exterior surfaces. Also describes basic types of aluminum finishes—satin, sandblast, bright, and "as fabricated." There are drawings and details of copings and gravel stops; curtain wall products, including facings, panel assemblies and wall units; industrial roofing and siding, weatherside and underside fasteners; trim and molding; sheet, plate, foil, pipe, rod and bar stocks; and structural shapes. An alloy section lists mechanical properties of applicable alloys. Aluminum Co. of America.

302 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

303 **Sound Absorbing Walls**—The advantages of Soundex walls and partitions are outlined in this 8-pp illustrated booklet. Includes photos, construction drawings, full specifications. GR Products Inc.

304 **Mobile Fire Walls**—This bulletin points out the advantage of company's Mobil fire walls. Describes three of the products designed for stopping the spread of fire within a building; fire doors, fire partitions, and non-combustible interior partitions, and presents test requirements. Virginia Metal Products Corp.

305 **Ideas for Framing**—Some 38 installations of Dexion slotted angle framing are pictured in this brochure. Advantages and features of this easily erected, inexpensive and reusable steel framing material are discussed and three types available are shown. Uses shown include supports for overhead conveyors, storage racks, electrical mounting, work benches, pallets and many others covering a wide range of industries. Acme Steel Co.

306 **Glass Block Fenestration**—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 32 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded ventilation below window sill. Test data is summarized and recommendations included. Kimble Glass Co.

307 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

308 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

309 **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

310 **Serrated Grating Treads**—Bulletin RR-255-A, 8 pp, describes and illustrates open steel floor grating and stair treads with serrated surface for greater safety. Presents four types and gives detailed selection information to aid in choosing proper grating for load-span conditions. A. O. Smith Corp.

311 **Steel Grating and Treads**—Bulletin 2486, 16-pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications, and includes specifications, photos and diagrams. Blaw-Knox Co.

312 **Metal Grating Handbook**—Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

313 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

MAINTENANCE

314 **Building Maintenance**—Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

315 **For Fast Floor Repairing**—This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

316 **Better Floor Care**—This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-

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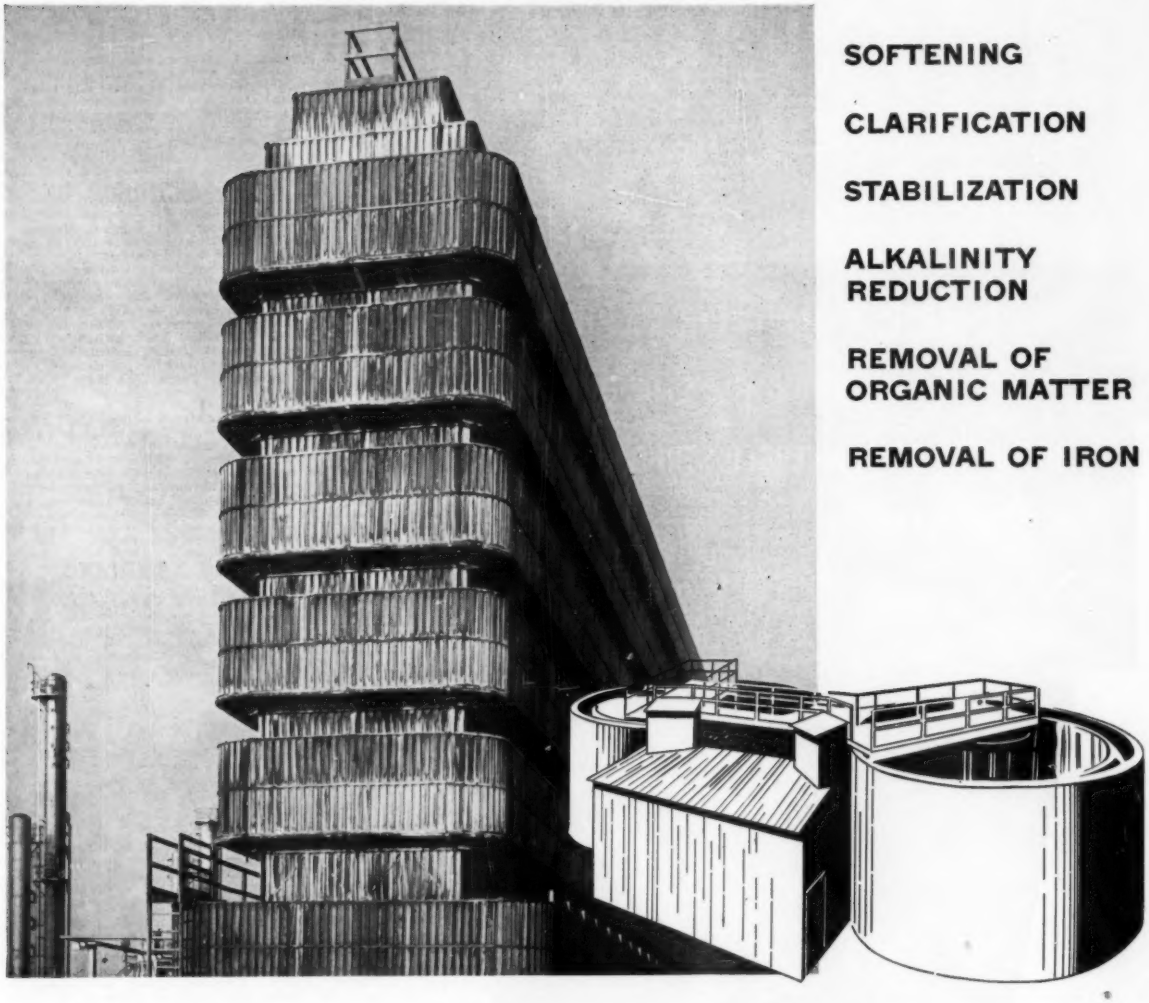

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DATA FILE

(Begins on page 186)

vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers, and cleansers. Finnell Systems, Inc.

317 **Cleaning Problem Solutions**—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

318 **Insulation Coating** — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe and data on effect of different humidities. J. W. Mortell Co.

319 **Protective Paints** — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal. Cellulose Products Dept., Hercules Powder Co.

320 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

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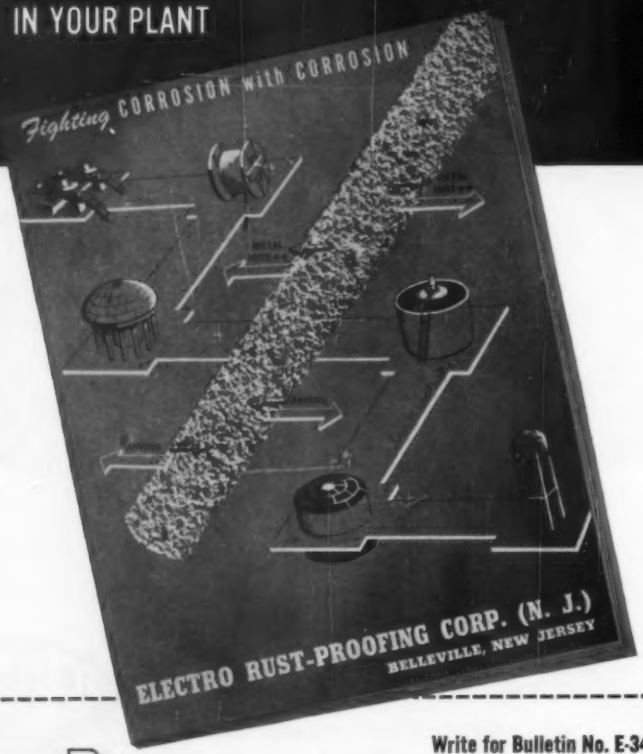

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E-34

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321 **Tar Base Coatings** — Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

322 **Fighting Corrosion With Corrosion**—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes design and application data. Electro Rust-Proofing Corp.

CHAIN SLINGS

323 **Sling Handbook and Riggers Manual** —In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are sling fittings. Information on care of slings, data on braided wire fabric and directions on splicing braided wire sling fabric included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments. Union Wire Rope Corp.

324 **Sling Chain Handbook**—Illustrated Data Book 100, 32-pp presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

MATERIALS HANDLING

325 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is the current edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

326 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

327 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

328 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys. Manning, Maxwell & Moore, Inc.

329 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

330 **Transit Crane**—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

331 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance are detailed. Chicago Tramrail Corp.

DATA FILE

(Begins on page 186)

332 **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 97 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

333 **Engineered Conveyor Systems**—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

334 **Continuous Power Conveyor** — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

335 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems. The B. F. Goodrich Co.

336 **Conveyor Trolleys** — A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

337 **Metal Conveyor Belts** — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

338 **Conveyor Belting**—Folder 54-3, contains a capsule description of construction, types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

339 **Lift Truck Work Kit** — A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

340 **Fork Truck Efficiency Test**—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

341 **Freight Elevators**—Elevators designed especially for power truck loading are described in this 8-pp illustrated bulletin. Discusses various requirements for impact, off-balance, and extra static loading and shows how design and structure of company's elevators meet requirements. Otis Elevator Co.

342 **Hydraulic Lifters** — Standard Products Bulletin 54, 12 pp, features new Worklifters,

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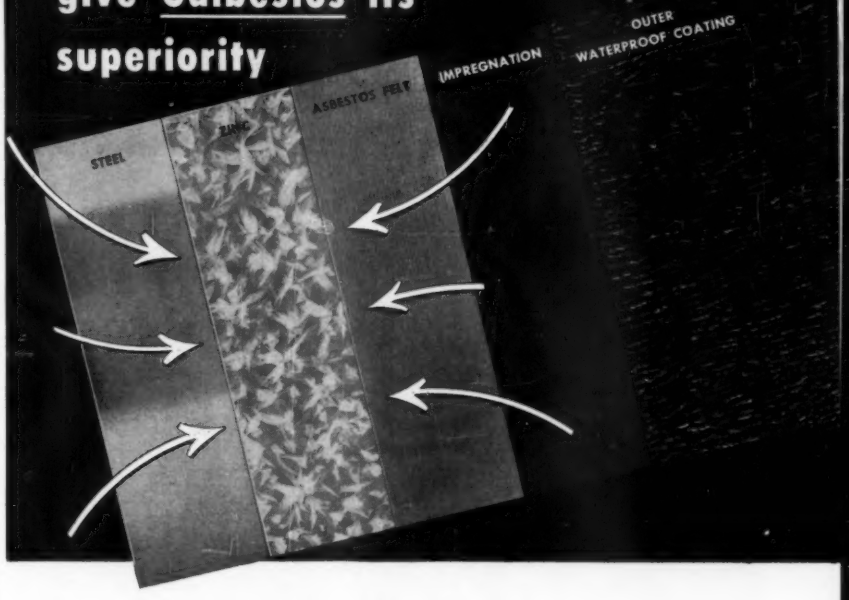
How molten metal helps give Galbestos its superiority



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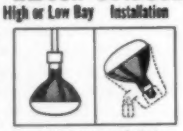

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You'll find two postage-free Reader Service Cards on pages 181-182. Use them for ordering these bulletins — just circle the item numbers of those you want. You may also use the cards for requesting advertised catalogs.

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portable, battery-operated, hydraulic lifters available in a variety of special purpose designs, in a 1000 lb capacity, and with lifts up to 80 in. Also describes company's Shoplifters with both hand powered and electric hoisting units. Economy Engineering Co.

343 **Sheet Lifter** — Operational and design features of company's sheet lifting equipment, which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

344 **Shock Absorbing Casters** — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

345 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

VIBRATION CONTROL

346 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased plant mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

347 **Vibro-Isolators** — Bulletin K3A gives latest data on stopping vibration, shock and noise transmission by using company's steel spring machinery mountings. Typical case-histories, complete with installation photos, tell how vibro-isolators solved a variety of vibration problems. Tables giving capacities and characteristics are furnished, including isolator sizes, load capacities, dimensions, and shipping weights. Drawings illustrate typical installation arrangemnets. The Korfund Co., Inc.

348 **How to Cut Vibration**—The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided. other felt products are listed. American Felt Co.

SPACE, PROCESS HEATING

349 **Unit Heaters** — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

350 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

351 **Unit Heaters** — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

352 **Gas-Fired Heaters**—Form PBI-54 describes and pictures company's Panelbloc heaters that generate infra-red rays that "heat like the sun." Discusses construction and operation of the heaters, and stresses such advan-

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tages as no air blasts, downward radiations, low maintenance. Gives specifications for the heaters which operate on any commercial type of gas fuel. Thermobloc Div., Prat-Daniel Corp.

353 **Electric Heaters**—Bulletin E-1, 8 pp, describes electric unit heaters and heater sections for general industrial heating as well as for specialized use in heating corners of factories, warehouses. Illustrates overhead downward discharge heaters with revolving and stationary discharge outlets, and a heater with horizontal discharge. L. J. Wing Mfg. Co.

354 **Electric Heat, 101 Ways**—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery and equipment parts. A section is devoted to far-infrared heating. Edwin L. Wiegand Co.

355 **Hot Water Heating Systems**—Catalog GK-954, 24 pp, features a complete line of equipment for forced hot water heating systems and chilled water cooling systems. Nine pages are devoted to information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressures are a few of the new applications. Valves, fittings, air vents, air tanks and water heaters are also described in detail. Bell & Gossett Co.

356 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

357 **Industrial Ovens** — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

INSULATION

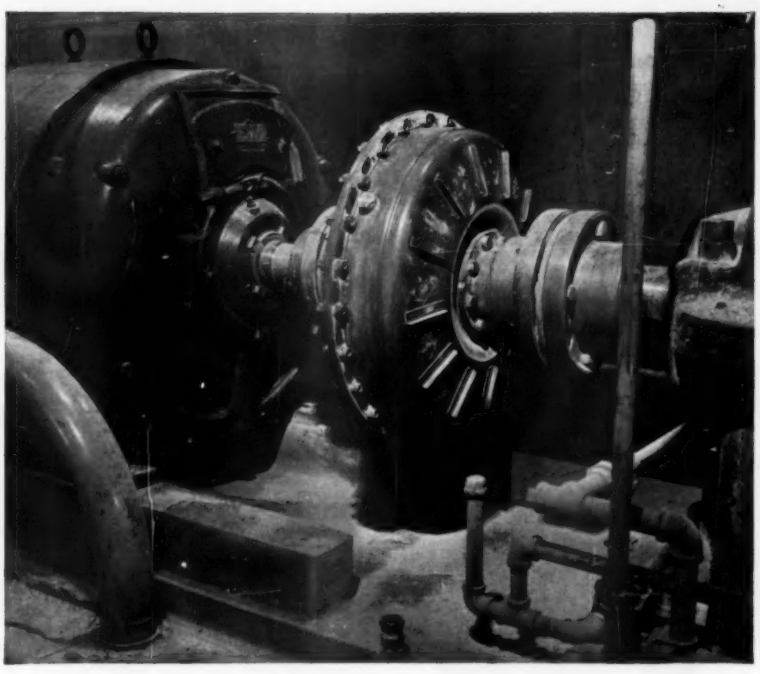
358 **Improved Heat Insulation** — This 8-pp bulletin describes Super-Light 85% Magnesia for temperatures to 600 F, available in cement blocks, pipe sections. Twelve advantages of this lightweight insulation are detailed. Recommended thickness, physical characteristics, prices are given. Also included is information on combination coverings with Tempchek inner layer for temperatures from 550 to 1500 F. The Philip Carey Mfg. Co.

359 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between −300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

360 **One-Coat Insulation**—This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from −40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Insul-Mastic Corp. of America.

VALVES, TRAPS, PIPING AND ACCESSORIES

361 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp



Power flows "smooth as glass" ...at Pittsburgh Corning

Terrific starting loads formerly took more power, caused frequent failures . . . were a constant source of clutch trouble and down-time at the Sedalia, Missouri, plant of Pittsburgh Corning Corporation.

Now, power flows as smooth as glass *from* the 200 hp 440-volt E.M. motors *through* two Model 17.5 HEM Twin Disc Fluid Couplings *to* the two 26′ long 7′ diameter Hardinge Mills that powder ground glass into "mix" for Foamglas insulation blocks. The starting load is still there . . . but the shock has gone!

Works Manager, Karl Baumler, says: "The Twin Disc Fluid Coupling with its trouble-free operation has enabled us to maintain constant production by avoiding unscheduled down-time." And, Fred B. Falk, Maintenance Foreman, backs this up with his "No Maintenance" record.

Drive through *Fluid* to...

1. **Free motors and engines from stalling, lugging and burning on heavy starts.**
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3. **Provide cushioned drive — with smooth, steady power flow.**
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5. **Get *full* output torque . . . equal to input torque.**
6. **Use *normal* starting motors where "specials" were formerly required.**

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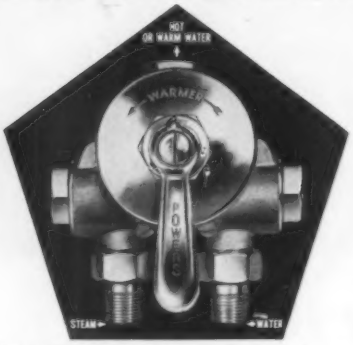

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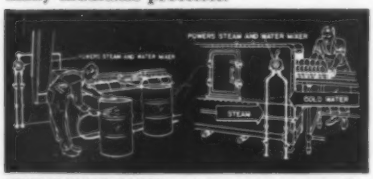
USES – Barrel washing, truck washing, sterilizing rinse water for dishwashers and many industrial processes.



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HAS PRESSURE EQUALIZING VALVE – which prevents delivery temperature changes caused by fluctuating pressures of steam or water.

SMALL SIZE – ½" pipe size can be held in the palm of the hand, weighs 7 lbs., ¾" size weighs 16½ lbs.

CAPACITIES – based on steam and water at 45 lbs. pressure each, water at 60°F., and delivery temperature of 120°F.: – ½" size = 5 gals. per min.; ¾" size = 11 gpm. Mixing steam with 140°F. water increases delivery volume about 75%. Often used as a small booster heater.

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booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

362 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

363 **Butterfly-Valves** — Construction details, engineering and application data on butterfly valves are provided in three illustrated bulletins. Eight-pp Bulletin 557 covers those of standard heavy-duty construction; Bulletin 558, 8 pp, those of standard medium-duty construction; and Bulletin 559, rubber-lined butterfly valves. W. S. Rockwell Co.

364 **Pressure Reducing Valves**—New 6-pp Bulletin W-3 completely describes G-A cushioned water pressure reducing valves, which automatically reduce an existing high pressure to a predetermined low pressure. The installation, operation, adjustment, servicing, and specifications are fully covered. Golden-Anderson Valve Specialty Co.

365 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

366 **Unions, Check Valves**—Illustrated Catalog 55, 24-pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

367 **Industrial Valves** — Condensed Catalog 105, 28-pp, contains data on valves for a wide variety of applications. Includes dimensions and illustrations describing non-return (stop-check) valves, globe and angle stop valves, pressure seal design, angle univalves and small size globe valves designed for chain or extension operation in vertical lines. Also included is company's Mudwonder valve for abrasive fluid application in industry as well as mudlines in the oil field. Edward Valves, Inc.

368 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific applications for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

369 **Valve Charts**—Now available to plant engineers are three well-organized wall charts on valve types, selection and protection. "How to know valves" covers four main types of valves from the standpoints of their appearance, inside construction, service intended, operation and use. "How to select valves" discusses five major factors involved in the choice of a valve—fluid, temperature, pressure, size, and function. "How to protect valves"—written in "do and don't" style covers 11 important points on valve installations, operation and maintenance. R-P & C Valve Div., American Chain & Cable Co.

370 **Bronze Valves**—Bulletin 110 points out the advantages of company's "500 Brinnell" bronze globe and angle valves with stainless steel seat and disc. Design features are illustrated and dimensional data is included. Kennedy Valve Mfg. Co.

371 **Valve Installation Tips**—Comprehensive instructions on proper way to install company's Line Blind valves are given in this pocket-size 24-pp manual. Concisely written, the booklet is illustrated with cartoon-type drawings. A separate section is devoted to trouble shooting for faulty-installation techniques along with recommended corrective procedures. While dealing primarily with Line Blind valves, this information can be applied also to gate, globe and plug valves. Hamer Oil Tool Co.

372 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

373 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

375 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines is told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

376 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

377 **Wrought Iron Pipe** — Technical information required in specifying pipe and tubing is graphically presented in this 52-pp catalog. Tables list size and dimensional data of wrought iron pipe and tubular products, and show dimensions. Data is also provided on wire and sheet metal gages, flow of water in gpm and conversion factors. Tables include size and dimensional data for various types of pipe. Supplementary tables give information on wrought iron physical characteristics and special properties. A. M. Byers Co.

378 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

379 **Corrosion-Resistant Fittings**—Lower installation costs, greater flexibility and improved flow conditions are among the advantages claimed for company's line of corrosion-resistant fittings described in this 24-pp bulletin. Includes photos, diagrams, and charts listing dimensions, other specifications. Horace T. Potts Co.

PUMPS, COMPRESSORS

381 **For Hazardous Liquids**—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs, selection table. Viking Pump Co.

382 **High Vacuum Pumps** — Catalog 400 describes company's mechanical booster high vacuum pumps. Points out advantages of two-stage construction, and illustrates characteristics in metallurgical vacuum processing, metallized coating, foundry research and pharmaceutical applications. A cutaway view is included, together with performance curves which show typical pumping speed, other data, horsepower vs. inlet pressure. Kinney Mfg. Div., The New York Air Brake Co.

383 **On Vertical Pumps**—This 16-pp bulletin describes and illustrates application of vertical industrial service pumps for liquid transfer from short settings in both industrial and process services. Points out advantages and describes three basic designs. Stresses versatility of the pumps due to design flexibility. Also gives general recommendations for obtaining opti-

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mum performance, and includes photos of typical installations. Peerless Pump Div., Food Machinery and Chemical Corp.

384 **Condensation Pumps**—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. C. A. Dunham Co.

385 **Data on Pumps**—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

386 **Continuous Flow Pump**—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

387 **Sump Pump Selector** — Bulletin 54-3-1420, 20 pp, provides a selection table allowing a plant engineer to choose any of the 4000 models of the BJ Sumpmaster pumps, which range from 10 to 2600 GPM with heads from 20 to 300 ft. Includes complete dimensions and outline drawings, simple coding system for ordering. Byron Jackson Co.

388 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

389 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

390 **Compressor Data**—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment in typical installation. Worthington Corp.

391 **Vertical Compressors** — Double-acting, motor driven vertical compressors are described as to distinctive features, regulation available, and construction details in 16-pp illustrated Bulletin 765-5. The improved cylinder design of these compressors and valve assemblies are discussed in detail. Booklet also describes air intake filters, air receivers, and aftercoolers available; and pictures some installations of the compressors. Chicago Pneumatic Tool Co.

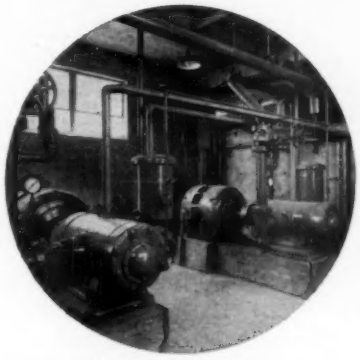
FANS, BLOWERS

392 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

393 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing

Algas engineered protection

MEANS MORE WHEN YOU CONSIDER AN LP-GAS STAND-BY PLANT



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This nylon plug locks the screw *automatically!*

NEW! Amazing, patented screw and washer combination cuts faucet washer replacements 75%

—with each leak eliminated, you reduce water and fuel bills up to $28.80 quarterly

Most faucet washer failures are caused by wrong length screws. 'Sexauer' Self-Locking screws* and Easy-Tite washers*—used together—cut costly washer replacements 75%! You save up to $28.80 quarterly in water and fuel alone with each leak stopped. Here's how . . .

A screw *too short* for the tapping distorts and splits the washer when tightened; the washer works loose, is torn to shreds. If *too long*, it can't grip the washer; this ruins the washer and causes hammering in the water line.

Simplifies fitting problem—cuts installation costs

NYLON PLUG

'Sexauer' Self-Locking screws eliminate the problem of misfit screws. They lock *automatically* at the required depth as the nylon plug is compressed in the faucet thread. The washer is not distorted, is held firmly.

You can re-use Self-Locking bibb screws repeatedly. Made of Monel, they resist corrosion, never rust; heads won't twist off, screw driver will not distort the slot.

Self-Locking screws save time spent in fitting the proper length—10 sizes do the work of 37! Used with new, Fiberglas-reinforced 'Sexauer' Easy-Tites, they cut washer replacements 75%, fixtures last longer. Easy-Tites resist closing squeeze and excessively hot water, outlast ordinary washers 6 to 1!

Water and fuel savings

One dripping faucet wastes 8,000 gals. of water yearly. A pinhole size stream increases waste to 8,000 gals. in a *single month!* Here is what you save *quarterly* in stopping just *one* pinhole leak on a hot water faucet:

Fuel Saving		Water Saving	Total Saving
Oil (198 gals.)	$22.77	$6.03	$28.80
Coal (2,469 lbs.)	22.22	6.03	28.25
Gas (21,103 cu. ft.)	21.20	6.03	27.23

Save water, fuel and labor costs; conserve costly fixtures by cutting washer replacements 75%! Use *new* 'Sexauer' Self-Locking screws and Easy-Tite faucet washers. *You save every time you do!*

WRITE FOR CATALOG. New 'Sexauer' Self-Locking screws and Easy-Tite washers are just part of the line of over 3,000 'Sexauer' Triple-Wear plumbing repair parts and patented precision tools. Send for our new, 126-page Catalog H. *Write today!*

*Reg. U. S. Pat. Off.

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WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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DATA FILE

(Begins on page 186)

controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

394 **Industrial Fan Catalog**—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive information, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

395 **Utility Blowers**—Dimensions, specifications, and performance data on non-overloading utility blowers with backward curved blades are presented in concise form in 48-pp Bulletin BC-11. Covers belt-drive and direct-drive models. Also company's Arrangement 2 utility blowers, and Arrangement 3 blowers available either single width, single inlet, or double width, double inlet. Hartzell Propeller Fan Co.

PACKINGS

396 **Teflon Products**—Three new bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

397 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M. D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

INSTRUMENTS, CONTROLS

398 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

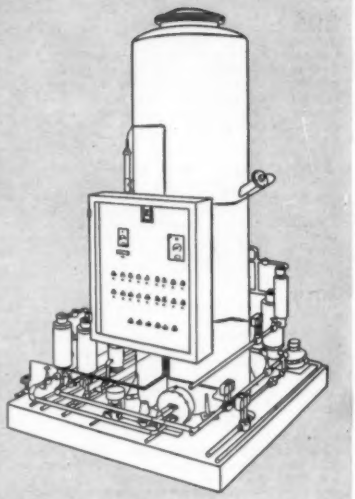
399 **Orifice Meters**—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

The two Reader Service Cards on pages 181-182 are easy to use and need no postage. Just circle the item number of catalogs wanted.

400 **For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

401 **Thermal Controls**—Descriptive information and basic technical data on company's Thermoswitch controls are presented in 52-pp Catalog 400. Generously illustrated, this booklet explains basic principle of the controls and why they are sensitive only to heat. Selection and application suggestions are provided, also

ILLCO-WAY ionXchange



NEW AUTOMATIC "PACKAGE" UNIT FOR LOW-MAKE-UP POWER PLANTS

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DATA FILE

(Begins on page 186)

ordering instructions. Products listed include cartridge, hex-head, block head, flange head, all-purpose, junction box, high temperature and other types of the controls. Fenwal Inc.

402 **For Industrial Metering** — Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

403 **Zone Control Equipment**—Economical operation of the heating plant through use of a zone heating control system is the subject of illustrated 12-pp Apparatus Bulletin T-385. Describes a standard and clock model, discusses electronic principle of the control system, lists specifications. Schematic drawings point out applications, show dimensions of cabinets and of bulbs and accessories. Johnson Service Co.

404 **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

405 **Gage Glasses**—Pyrex and Corning gage glasses, their dimensions and tolerances, recommended maximum working pressures, are discussed in Bulletin EG-1. Explains how to cut odd lengths of tubular gage glasses and how to install them. Technical Products Div., Corning Glass Works.

406 **Wide Range Regulator**—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

MECHANICAL POWER TRANSMISSION

408 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

409 **Sprockets and Chain** — Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

410 **Improved V-Belts** — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

411 **Adjustable V-Belt** — This 8-pp catalog covers company's new Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows current lengths for these belts. Manheim Mfg. & Belting Co.

412 **Improved Motor Pulleys**—The complete redesign of this company's standard line of Vari-Speed motor pulleys is described in 28-pp

Unique turbulent area assures positive dust collection at constant efficiency . . . to the micron range

Here is the "heart" of the Hydro-Filter principle of dust separation. This violently turbulent area of water, bubbles and mist is produced by the countercurrent action of air against water. Constant long contact between the air being cleaned and the water which is doing the cleaning produces a scrubbing action which is positive, thorough and unaffected by variation in volume and velocity of flow. Dust is entrained by any, or all, of three means: (1) Entrapment within falling water droplets; (2) Impingement on bubble surfaces; (3) Impingement on wetted surface of glass spheres.

As the photo indicates, the entire collection area is continually flushed. There are no dead areas to corrode or erode. No moving parts to "load up" and reduce efficiency. Maintenance is a matter of *minutes a month*. Collection of dust to micron size is continuous and sludge removal automatic with the National Hydro-Filter.

Write for Bulletin 55 . . .

See why and how separating efficiencies of up to 98.9% on foundry shakeout dust are possible practical—and continuous with Hydro-Filter!

NATIONAL HYDRO-FILTER

Dust Collector Corp.

604 Machinery Hall Bldg., Chicago 6, Illinois

Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

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Whatever your heating job may be, you'll find the efficient, economical answer in . . .

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. . . for heating platens, dies, molds, metal parts . . . for heating liquids, air, gases . . . for curing, drying, baking . . . for comfort heating in offices and factories . . . for special applications . . . in fact for any application requiring fast, low-cost, controlled heat up to 1100°F.

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To get some interesting facts about additional applications of electric heat, ask for Booklet F1550—"101 Ways to Apply Electric Heat."

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DATA FILE

(Begins on page 186)

Bulletin V-545. Replete with illustrations, some in full color, this booklet covers construction details, lubrication, controls available. Provides instructions on how to select proper unit, complete rating tables and dimensional diagrams. Also includes data on the Vari-Speed Jr. Reeves Pulley Co.

413 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

414 **Fluid Couplings**—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from ¾, to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

ELECTRICAL

415 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

416 **Industrial Electric Motors** — Bulletin N-100 presents technical data on company's Series 100 electric motors. Includes table listing frame sizes, dimensions, schematic drawings. Howell Electric Motors Co.

417 **Motor Buying Guide** — Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general- and definite-purpose, fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

418 **Motor Starters** — Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

419 **Toggle Switch** — Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

420 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

421 **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one

NOW—all from one source

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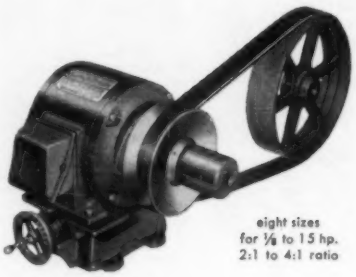
- Reliance Ac motor
- Vari-speed belt
- Driven pulley



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REEVES

Vari-Speed Motor Pulley

This simple, compact REEVES unit provides an economical way to widen machine range, and an efficient method of adjusting work flow to changing conditions. Speed variations are effected smoothly and instantly—without stopping the machine! Unit also available without motor. For bulletin complete with rating charts and dimensions, write Department PE18-V545.

The right speed for every need!

The wide range of REEVES variable speed equipment is now supplemented by the line of Reliance drives. Now—more than ever—you can rely on your REEVES representative for the answer to any speed control problem.

REEVES PULLEY COMPANY

Columbus, Indiana

Division of RELIANCE Electric and Engineering Co.

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DATA FILE

(Begins on page 186)

useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

422 **The Answers on Wiring** — "20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths is included. General Cable Corp.

423 **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

424 **Power and Control Cables** — Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

425 **Electrical Conduit**—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

426 **Finding Fault Grounds**—This 32-pp illustrated booklet covers use of the Allen ground detector in the detection and location of electrical fault grounds. Separate chapters cover grounded vs ungrounded systems, operating instructions, explanation of misreadings encountered, complete cancellation, detection of fault grounds in lead-covered underground cable, tracing buried and/or hidden elements. Excel Electric Service Co., Inc.

427 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

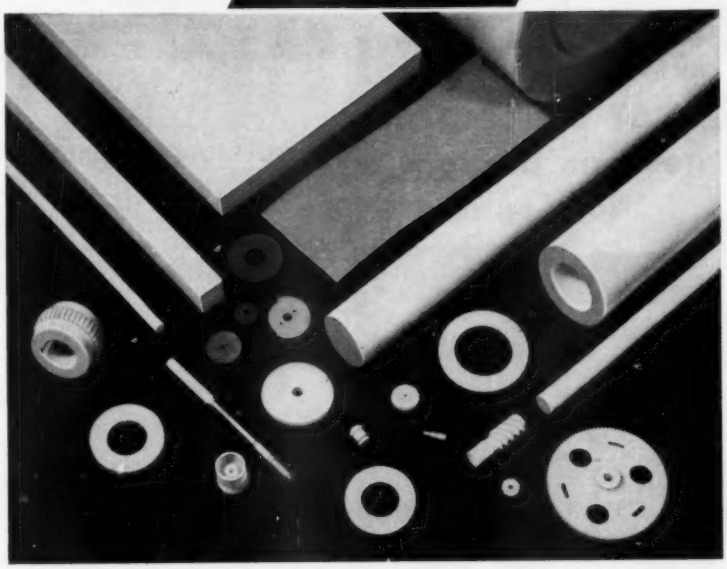
428 **Battery Manual**—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 181-182.

429 **Batteries for Control Switchgear**—This company's PlastiCal (lead calcium) and PlastiCell (high-tensile alloy grid) batteries for control, switchgear, and auxiliary power are described as to design, application and performance in Bulletins CP-536 and CP-537. Specifications given. C & D Batteries, Inc.

430 **Flexible Cords** — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

POLYPENCO® NYLON SHAPES



Machine Parts Accurately and at Low Cost from POLYPENCO Shapes

• Simplify your design and production problems right at the start. With high quality POLYPENCO shapes you can fabricate parts at low cost, maintain complete control over production, and change design at a moment's notice.

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Fabricating from POLYPENCO rod, bar, tubular bar, strip or slab is easily and quickly done on any standard metalworking equipment. Machined parts result in closer tolerances and more uniform dimensions. Moreover, many parts can be produced at high speed on automatic machines.

YOU CONTROL YOUR PRODUCTION

Because nylon parts can be machined from POLYPENCO shapes on conventional metalworking tools in your own shop, direct control over parts production is a simple matter. Production schedules and quality control fall under your direct supervision.

MAINTAIN PRODUCTION SCHEDULES— RAISE UNIFORM QUALITY

You get *all* the desirable properties of nylon in POLYPENCO shapes in piece after piece, order after order. Rigid quality control assures uniform density, dimensional stability, free of porosity and stress spots. This means steadier production and fewer rejects. POLYPENCO Nylon Shapes are stocked in convenient sizes for immediate shipment from warehouses located throughout the country.

For complete data and specifications on POLYPENCO Nylon Shapes write for a copy of the Nylon Bulletin.

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POLYPENCO nylon, teflon* and other non-metallics

* DU PONT TRADEMARK

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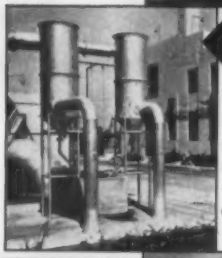
Inside—Outside Topside!

MULTI-WASH DUST COLLECTORS need no productive floor space

Inside

How Multi-Wash collectors can be installed, up off the floor, inside the building.



Outside

Installation of collectors outside the plant, conserving floor space for productive work.

Topside

Battery of Multi-Wash units installed on the roof of a large production factory.

Schneible Multi-Wash Collectors were designed to save money in many ways. Not the least, is the variety of methods of installation. In a majority of instances Schneible installations are operating without taking away any valuable production space.

This means profit from every foot of floor space, plus cleaner, more healthful working conditions that increase productive effort.

Specify Schneible Dust Control for simplicity and efficiency.

SCHNEIBLE

CLAUDE B. SCHNEIBLE CO.
P.O. Box 81, North End Station
Detroit 2, Michigan

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198

DATA FILE

(Begins on page 186)

431 Wire-Wound Components—Catalog R-200, a 36-pp guide to manufacturer's electronic components, describes subminiature resistors, precision and power resistors, IF and RF transformers and coils. Tables and charts give specifications. I-T-E Circuit Breaker Co.

LIGHTING, COMMUNICATION

432 Fluorescent Lighting—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

433 Lighting Fixtures—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

434 Precision Lamps—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are discussed. Radiant Lamp Corp.

435 Guide to Luminaires — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data concentrates information needed for procurement. Westinghouse Electric Corp.

436 Industrial Lighting Equipment—Technical data on company's CFI-10 and CFI-25 industrial lighting equipment with porcelain enamel reflecting surfaces is featured in two new illustrated bulletins. Chief design features are pointed out and dimensional data are given. Day-Brite Lighting, Inc.

437 How to Use Sound Signals—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

438 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

TOOLS AND MACHINE SHOP

439 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

440 Portable Electric Tools — This 1955 Standard Catalog, Form 10, 24 pp, features company's line of portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners, and others. Photos and full specifications included. The Black & Decker Mfg. Co.

441 Where to Use Your Stud Driver — Twenty-pp pocket-size Form 955 describes and

use JOY SURGEPRUF

... THE NON-SKIVE COUPLING WITH THE DOUBLE-WEDGE GRIP

PERMITS THE USE OF MORE ABRASION-RESISTANT, RUBBER-COVERED HOSE

Insure longer wear in your hydraulic hose assemblies—and at the same time, save assembly time by avoiding old-fashioned skiving. Joy Surgepruf re-usable couplings make *both* advantages possible. Their exclusive "double-wedge" grip lets you use tough, abrasion-resistant, rubber-covered hose instead of the braided type—without any need for skiving the hose at the connection.

NO SPECIAL ASSEMBLY TOOLS REQUIRED

You need no mandrels or special tools to make up Surgepruf assemblies. No extra cost or special method is involved.

CAN BE RETIGHTENED WHEN LOOSE ON THE HOSE

Machine vibration or hose flexing can loosen any hydraulic coupling on the hose in time, but Surgepruf Couplings can be easily, quickly retightened on the job to stop a leak—*another* exclusive feature.

Surgepruf Hose Couplings are made to JIC Standards. Assemblies are available in many sizes and lengths, and in both single and double-wire reinforced types for medium-high and high pressure service respectively. *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*

Write for FREE Bulletin 10-15

Consult a Joy Engineer

JOY

HYDRAULIC ASSEMBLIES THAT GIVE YOU MAXIMUM RELIABILITY

W&D H5020-10

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America has homework to do!

THERE'S PROBABLY a lot about your town that makes you want to brag a bit about it.

But there's one thing you *can't* be proud of. And it's a shame you share with just about every other community in America.

The homes where far too many people live are a disgrace. Slums, semi-slums, housing blight are with you. Fixing them up is the homework to be done.

If your town is like most in the U. S., here's what the figures show: 1 out of every 10 homes are rock-bottom slums. Nearly one-half urgently need basic repairs.

But slums are something that is happening on the other side of town, you may say. The problem isn't mine.

Slums are YOUR homework

Distance is no barrier against the threat and cost of housing blight.

Your taxes go up because it takes more money for your town to fight the diseases and delinquency and poverty spawned in the slums. The security of your family goes down because the slum is the natural parent of crime.

Where your business comes in

Every firm has a responsibility toward the town where it's located. Part of it is to support community improvements as any other good citizen would.

Some slums are beyond repair. They must be torn down and a fresh start made. Others can be made to conform to accepted living standards. So it is up to you to get behind every sound program which seeks to provide adequate housing for all our people.

Civic and individual groups must have business backing . . . *your* firm's backing if they are to succeed.

Follow the course of Action!

A group of Americans from every walk of life has joined together in a non-profit organization to combat home and community deterioration, A.C.T.I.O.N., the American Council To Improve Our Neighborhoods.

Send today for a free copy of "ACTION." It explains what A.C.T.I.O.N. is and proposes to do. It lists booklets, research, check-lists, and other material which can help you. Address P. O. Box 500, Radio City Station, New York 20, N. Y.

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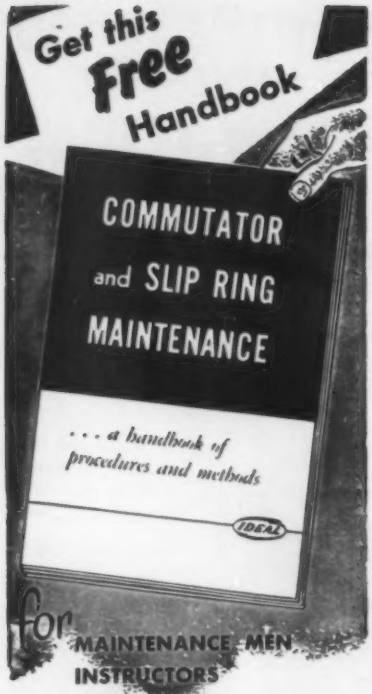

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(Begins on page 186)

pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

442 **Machines for Special Products** — This 12-pp catalog lists company's machine tools and other metal fabricating, forming, treating and processing equipment which is now available for contract manufacturing. Types, quantities and operational dimensions of the facilities are included. The Jeffrey Mfg. Co.

AIR CONDITIONING AND DUST CONTROL

443 **Improved Dust Filters**—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters available housed or unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are described in detail. The Day Co.

444 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

445 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

446 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

447 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust source. American Air Filter Co., Inc.

448 **On Dust Collection** — Specifications and descriptive details about company's Hydro-Filter are contained in 12-pp Bulletin 55. Tells how unit uses filtering principle to trap dust by impingement on glass spheres; entrapment on bubble surfaces and containment within water droplets. Separating efficiencies, application data, construction and design, as well as a description of models, capacity range available and description of laboratory facilities are included. National Dust Collector Corp.

449 **Flexible Hose**—A set of five new bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

450 **Dust Collection** — Aerodyne dust collectors in chemical processing and other industries are discussed in 8-pp Bulletin 171. Explains theory and design of collector system, includes drawings of the various types covered. The Green Fuel Economizer Co., Inc.

451 **Tubing for Many Jobs** — Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp

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Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube R, two types of lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of fabric. Gives applications. Flexible Tubing Corp.

MAGNETS

452 Magnetic Selection Guide—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serves as handy guide to selection. Dings Magnetic Separator Co.

453 Lifting Magnets—Eight-pp Bulletin 35-C illustrates and describes company's permanent magnetic separation and transmission equipment. Provides detailed specifications and application information on circular and rectangular lifting magnets and includes cutaway diagrams illustrating construction. Stearns Magnetic, Inc.

WATER CONDITIONING

454 Testing Equipment—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.: cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

455 Handbook on Demineralizing—Comprehensive 40-pp Bulletin 5800-B compares various methods of water treatment, indicating the comparison between demineralizers and evaporators. It discusses the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use 2-bed, 3-bed, 4-bed, mixed or mono-bed demineralizers. It also indicates when decarbonators or vacuum deaerators are required. The bulletin is replete with typical flow diagrams, photos of installations. Cochrane Corp.

456 Information on Ion Exchangers—Here are three booklets on ion exchangers; Nalcite HCR, a styrene type cation exchanger; Nalcite SAR, a basic anion type; and Super Nalcolite, a synthetic gel type zeolite for cation exchange. Tables and graphs explain performance of these water treating resins under various operating conditions. Physical characteristics, exchange capacities, regeneration techniques given. National Aluminate Corp.

457 For Industrial Water Softening—Greensand, zeolite and resinous exchange water softeners are described in 8-pp Form S105. Discusses features and applications of each of these basic types and illustrates some installations. Includes capacity data and general specifications. Also describes and pictures controls for water softeners, pressure filters and deionizers. Illinois Water Treatment Co.

HOSE, COUPLINGS

458 Hose and Tubing—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggests uses; gives data. The American Brass Co.

459 Improved Hose Coupling—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Tileflex, Inc.

SANITATION

460 Advice on Washrooms—Information on company's washroom advisory service is avail-

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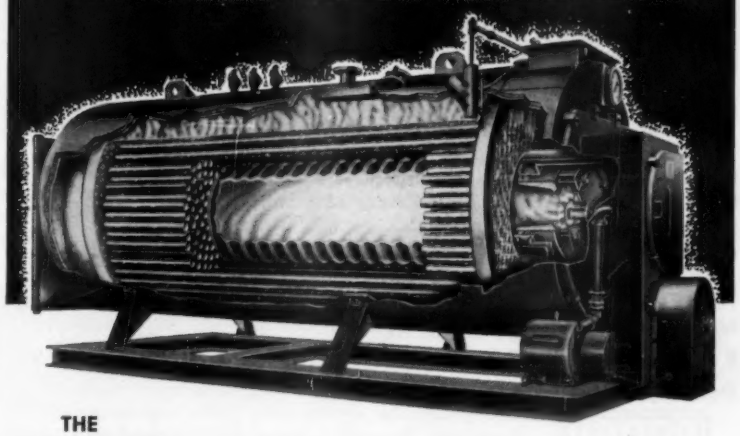

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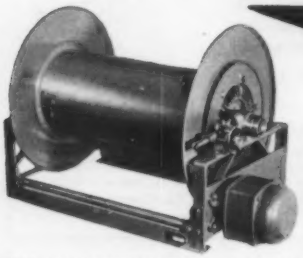

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(Begins on page 186)

able to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

461 **Insect Control**—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are discussed in detail. Atomizers, mistorizers and fogging units are pictured and described as to advantages and applications. West Disinfecting Co.

LUBRICANTS, LUBRICATION

462 **Automatic Lubrication**—Sixteen-pp Catalog L-52 describes force feed lubricators of all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 units, 1 to 24 feeds per minute. Hills-McCanna Co.

463 **Colloidal Graphite**—Bulletin 421 contains photos, diagrams, charts, and general information on the advantages offered by colloidal graphite in the assembly and run-in of machines. Shows how to use colloidal graphite, chiefly in the form of a petroleum oil dispersion. Acheson Colloids Co.

464 **Bearing Lubrication**—Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The Texas Co.

465 **Centralized Lubrication**—Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication—in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump controlled by a timer. Alemite Div., Stewart-Warner Corp.

466 **Force Lubricators**—Twelve-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Manzel Div., Frontier Industries, Inc.

FILTERING

467 **Filters, Strainers**—Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micronic filters and precision strainers. Fuel filters, full-flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

468 **Fundamentals of Filtration**—"Filter Facts No. 1" is a 12-pp engineering paper. Discusses such subjects as the lubrication system; contaminants and their damage; filter materials; filter construction; filters in relation to detergent oils, and to engine fuels; conditions affecting size of filter and type of installation. Engine Life Products Corp.

469 **Filter Fabric Facts**—This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fibers for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Photos illustrate variety of filter fabrics being produced for industrial use. Wellington Sears Co.

DATA FILE

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BOILERS, GENERATORS

470 **Packaged Boilers** — This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Enginering, Inc.

471 **Package Boilers**—This 12-pp booklet on package steam generators, describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

472 **For Lower Steam Costs** — "Have You Checked Your Steam Costs Lately?" is a 16-pp, non-technical picture and caption presentation; it serves to focus attention on high-cost features of antiquated boiler equipment. The first part of the booklet emphasizes typical boiler plant problems. The latter part illustrates packaged automatic boiler installations in industrial plants, others. Orr & Sembower, Inc.

OTHER EQUIPMENT

473 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

474 **Humidification for Profit**—Bulletin 500, 16 pp, includes physical data and prices on electrically controlled and air operated humidifiers. Handbook section explains how relative humidity affects hygroscopic materials, static electricity, health and comfort. Photos show installations and several pages are devoted to selection and installation tips. Many helpful tables included. Armstrong Machine Works.

475 **Storage Shelving** — Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

476 **Steam Accumulator**—How the steam supply and demand can be balanced by means of company's steam accumulator is told in Bulletin RA-52-8. Stresses reduced boiler capacity required and increased boiler efficiency afforded by use of the accumulator, other advantages. Foster Wheeler Corp.

477 **Precision in Packaging** — The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles. Robert Gair Co., Inc.

478 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

479 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

480 **Economy of LP Gas**—"The Aircraft Story," 8 pp, gives the report of a test made

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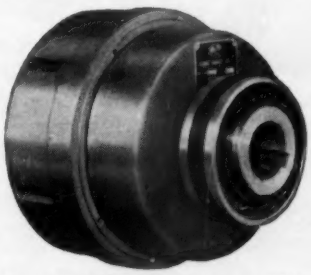

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DATA FILE

(Begins on page 186)

at one aircraft company, and results which another aircraft company obtained after converting their fleet of internal plant trucks to LP gas operation. Explains advantages of LP gas as an engine fuel and steps necessary in conversion of equipment to LP gas operation. American Liquid Gas Corp.

481 **Powder Metallurgy**—Manual E-55 is a 52-pp treatise on powder metallurgy, liberally illustrated with photos, tables, charts and graphs. Additional illustrative material is presented in case histories. Separate sections are devoted to bearings, component parts, and filters. Also covered are design, loads, and speeds, installation, press fit, close-in, shaft clearance, wall thickness, tolerances, temperature change, lubrication, machining, magnetic properties, flow rates. Physical properties of ferrous and non-ferrous metal powder materials are compared. Chrysler Corp.

482 **Super Polyethylene**—A new type of polyethylene which has greater heat resistance, greater structural stiffness, and better appearance than previous types, is the subject of 16-pp Bulletin C-5-216. Properties of the thermoplastic material are detailed, as well as typical applications. Chemical Div., Koppers Co., Inc.

483 **Large Capacity Condenser**—Bulletin 123 describes the 400-ton capacity Aeropass condenser and fluid cooler. Explains and illustrates operating principles of the unit. Lists benefits offered for large liquid cooling and condensing applications. Niagara Blower Co.

484 **Felt, Felt Products**—This 24-pp technical design book describes hundreds of uses of felt, with emphasis on mechanical applications. Explains and illustrates how felts are used for their friction qualities, for cushioning, for filtering, for insulating, for sealing, for spacing, and as wicking. Gives design properties of felt and discusses 10 reasons for its importance to industry. Also tells how to select the proper felt for the job. The Felters Co.

485 **Industrial Leathers**—These illustrated data sheets cover company's leather products and include belting. Also give data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

486 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

487 **Physical Properties of Synthetic Organic Chemicals**—In 24 pages, booklet F-6136 presents the latest data on more than 350 organic chemicals. It features 46 new products available from this company. For easy reference, chemicals are arranged by family groups with condensed application data. Physical properties are given. Carbide and Carbon Chemicals Co., Union Carbide and Carbon Corp.

488 **Fire Hose Reels**—Sixteen-pp Catalog H-511-F describes hose reels for fire fighting equipment, with illustrations of various models and cutaway view showing component features. Specifications, as well as descriptions of operational advantages are included. Clifford B. Hannay & Son, Inc.

489 **Self-Lubricating Bushings**—Eight-pp Bulletin Form 112 discusses company's Graphalloy bushings, designed for strength and high heat dissipating qualities. Also discusses such advantages as durability, no fumes, low and high temperature operation, fire preventive and low coefficient of expansion. Presents engineering data. Graphite Metallizing Corp.

490 **Blast Cleaners, Dust Collectors**—Eight-pp Bulletin 100-A covers company's blast cleaning machines, dust filters, and welding fume collectors. Describes direct pressure generators, abrasive blast cabinets, blast cleaning rooms and elevators, welding fume collectors and others. Ruemelin Mfg. Co.

491 **Improved Quenching Oil**—A new quenching oil with thermal stability and high boiling range, particularly suitable for quenching systems requiring a high flash-point, is described in Form A-3073. Discusses advantages of this quenching oil and includes specifications. Sun Oil Co.

You may use the two Reader Service Cards to request information on ads, too. Just circle the key number appearing at bottom of the ad.

492 **High Temperature Thread Compound**—The advantages of company's thread compound for use in high temperatures are outlined in this informative pamphlet. Lists chemical properties, describes application and function, and offers comparison data on performance of this compound. Felt Products Mfg. Co.

493 **Rigid Plastic Material**—The advantages, uses and available forms of Bolatron 6200 are presented in this catalog, about 14 pp. Gives dimensional data, tolerances, weights for sheet, bar stock, pipe, fittings and valves made of this unplasticized polyvinyl chloride. Includes thermal, electrical and mechanical properties, also detailed information on chemical resistance. H. N. Hartwell & Son, Inc.

494 **Effective Iron Removal**—This illustrated bulletin describes a closed pressure, non-chemical, single pumping iron removal filtration system for eliminating rusty water problems. Tells how the system works, shows application in one typical plant. A diagrammatic drawing showing component parts is included. Aquatrol Ferr-X Corp.

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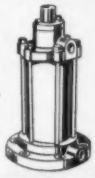

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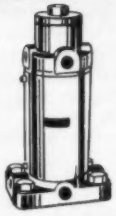

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Write for Bulletin No. 152P

Parks-Cramer Company
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Fitchburg, Massachusetts

For more facts circle 646 on Reply Card

Most versatile of all industrial fans

1020 to 85000 CFM

12" to 60" sizes

Mounts in any position

PROPELLAIR TYPE "CD" DIRECT CONNECTED FAN

Use this heavy-duty fan for ventilation . . . to exhaust heat, dust, moisture, fumes and smoke. It's powerful, dependable, efficient. Use it in ductwork, hoods, roof ventilators, wall mountings or for air circulation and cooling. Engineered to move a lot of air at low cost.

You get these important features:

- Cast aluminum airfoil propeller for greater efficiency
- Dependable R & M *All-Weather* Motor direct connected for long, trouble-free service
- Venturi entrance ring with tip seal to create efficient air flow
- Rugged steel motor support arms welded to entrance ring
- Explosion-proof and glass-insulated motors available
- Fan and motor covered by a single Robbins & Myers guarantee

Certified Ratings — AMCA

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R&M PROPELLAIR®
DIVISION OF ROBBINS & MYERS, INC.
SPRINGFIELD · OHIO

Man Cooler | Sky-Blast | Vaneaxial | Tubeaxial | Extended Shaft

For more facts circle 647 on Reply Card

NEW PRODUCTS

(Begins on page 134)

47—PANEL CONTROLS protect automatic burners

Fireye A-C Panel Control Systems are announced as offering complete burner protection and automatic operation for commercial-industrial oil, gas, and combination oil-gas burners. Flame failure safeguard, programming control, short-circuit protection, motor starters, fuel selector switches, signals and alarms, are combined in a single, integrated pre-wired panel unit. Optional equipment for the assembly includes sequence draft controls, draft and temperature indicators, and provision for switching to modulated or fixed-rate firing. Combustion Control Div., Electronics Corp. of America.

48—PORTABLE HEATER for outdoor applications

Construction and other work during coldest weather is possible with the Summeraire portable high capacity space heater, it is announced, which sends out a stream of heated air at the rate of 2400 cfm. The unit has a capacity of 300,000 Btu per hour and can be used to dry out new construction; to prevent freezing of freshly poured concrete; and to thaw the freeze-out of winterbound equipment. Not the least of its advantages is in creating comfortable working conditions for construction crews, even in bitter cold. Burning 2.15 gal. of No. 1 or No. 2 fuel oil or kerosene per hour, its 25-gal. fuel tank lets it operate at full blast for 10 hrs. without refilling. The hot air discharge outlet has an adjustable deflector to control direction of heat flow, and fittings for attaching an air duct. Fire and water resistant, asbestos lined hot air ducts, in 10 ft. lengths, are available. The heater is equipped with safety controls to protect against flame or power failure. In either event, machine automatically shuts down. The burner in this heater is of the pressure atomizing type. Clayton Mfg. Co.

49—LADDERS are built to support two men safely

Constructed of Sitka spruce or West Coast hemlock, this new line of mechanic's and electrician's ladders have reinforced steps on the front and treated hickory rungs on the back. Instead of having two smaller-sized rear legs, these ladders have four legs of uniform proportions. This is said to lend greater stability to both one- and two-man operations. The ladders are reported especially adapted for the use of millwrights and electricians, who occasionally work in pairs on the same ladder or climb either side without moving the ladder. A pail rest can be added, if desired.

Among features of the ladders are ribbed nails for fastening the steps to rails and solid rivets which hold the rust-proofed spreaders. The ladders come in 3- to 20-ft sizes. The Cleveland Ladder Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 181-182.

50—CLUTCH provides release at overload limit

The Trig-O-Matic Overload Release Clutch is designed to prevent overloads in power drives by providing positive torque limits without wearing parts, accomplished by the lock-out design which provides complete disengagement. When clutch is in engaged position it is preset to a definite torque limit through use of two coil springs, adjustable to any required torque range accommodated in basic eight units available. When engaged, driving pawl is locked into the "V" of the rotor. This, and the reset pawl, combine to give the total torque limit setting.

When clutch torque limit has been overcome by an overload condition, driving pawl is disengaged from "V" of rotor. It is locked out by reset pawl at time of disengagement. At the same time the micro pin is forced outward on

NEW!
INSTANT SETTING FLOOR PATCH!

Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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FLEXROCK COMPANY (Offices in principal cities)
3615 Cuthbert St., Philadelphia 1, Pa.

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and Free INSTANT-USE BROCHURE—no obligation. (Clip and attach Coupon to Co. letterhead.)

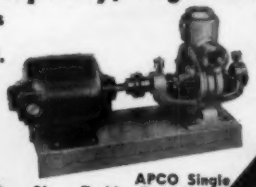
Name..... Title.....
Company .....
Address .....

For more facts circle 648 on Reply Card

You Cannot Beat Turbine-Type APCOS for Small Capacity, High Head Duties

Capacities to 150 G.P.M.

Heads to 600 Ft.



APCO Single Stage Turbine-Type Pump

Write for BULLETIN 111

APCO Turbine-Type PUMPS —ideal for "1001" duties where small capacities and high heads predominate. Get acquainted.

AURORA CENTRIFUGAL PUMPS are available in many types and sizes —all noted for their streamline coordination between impellers and shells.

AURORA Always PUMPS

We Invite Your Special Pump Problems

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AURORA® PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
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"LIQUIDS WORTH STORING ARE WORTH MEASURING" WITH A **LIQUIDOMETER** *Tank Gauge*

WRITE FOR COMPLETE DETAILS

THE **LIQUIDOMETER** CORP.
36-31 SKILLMAN AVE., LONG ISLAND CITY, L.N.Y.

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LEARN ABOUT *Speedline* **STAINLESS STEEL FITTINGS**

22 Illustrated Pages Tell You HOW and WHY SPEEDLINE FITTINGS

- Speed piping installation
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Speedline STAINLESS STEEL FITTINGS

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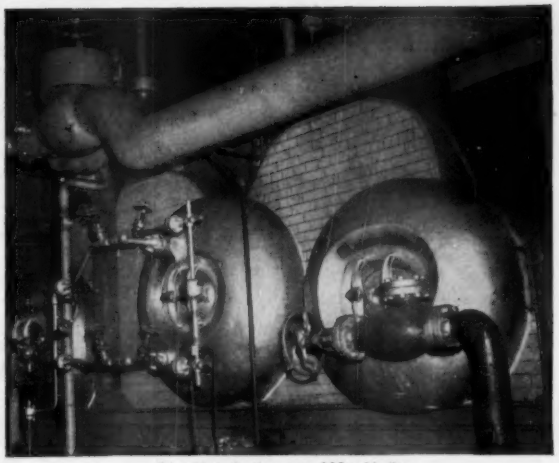
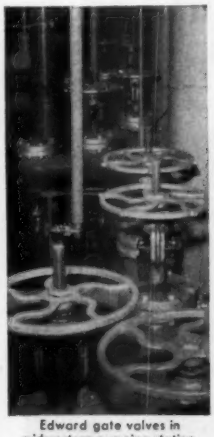


Edward steel valves on a 300 psi boiler in a metropolitan water pumping station.

Pumping Station Uses Edward Valves For Trouble-Free Dependability

LARGE MIDWESTERN CITY BUYS HIGH PERFORMANCE STEEL VALVES TO INSURE FUTURE SAVINGS



Edward gate valves in midwestern pumping station.

Pumping water for a large city is an operation that requires dependable equipment.

To insure against valve failures, this large midwestern pumping station uses Edward steel valves in strategic locations on all boiler and pump piping. Although the boiler is rated for 300 psi, steam pressures in many services are low enough to permit cast iron or bronze valves. Nevertheless, Edward steel valves are used for long range economy and dependability.

Often just the labor to repair or replace valves costs much more than the valve. Therefore, cost conscious engineers are specifying Edward even for 100 to 150 psi service.

You too can cut valve repairs and replacements while getting the extra convenience of trouble-free dependability. Install Edward steel valves for water, oil, gas, steam and other fluid services. The added quality more than justifies the slight additional cost.

Buy Edward for new installations. Buy Edward for replacement. High performance Edward valves will save you money today and throughout the life of your plant.

Write for the Edward condensed catalog or contact your nearest Edward representative.

Rockwell-Built EDWARD Valves

Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY

1208 W. 145th Street, East Chicago, Indiana

For more facts circle 652 on Reply Card

NEW PRODUCTS

(Begins on page 134)

outer periphery of housing. This, in turn, actuates a micro switch and power supply is shut down or a signal is provided. To re-engage the clutch, a reset screw is adjusted until unit is in position of original engagement to provide exact amount of torque limit originally set up. Centric Clutch Co.

51—INHIBITED ACID removes water scale deposits

Dynasol 55 is a non-volatile, non-hygroscopic, white crystalline solid inhibited acid which forms extremely soluble salts with calcium, magnesium, sodium, phosphate, and non-metallic iron. It is announced for the safe and complete removal of water scale deposits from heat exchange equipment and water lines. Acid strength is equal to sulfuric acid. Product is shipped in 50 lb and 500 lb polyethylene lined steel containers, and no returns on containers or deposits are required. It is dissolved in water to make liquid acid of desired strength. Chemical Cleaning Service, Inc.

52—ON-OFF TIMER offers a high load capacity

Independently adjustable on and off time ranges are featured in the Model T-3. This electronic timer is designed for use on life test equipment, proportioning controls and process or machine applications requiring on-off timing cycles. It has DPDT load contacts rated at 20 amp, 115 v a-c, non-inductive load. The circuit employs cold cathode tubes requiring no warm-up time before use, it is stated, and accuracy is within ± 1 per cent and independent of line voltage fluctuations from 105 to 125 v. Standard available ranges are 0.3-25 sec per section and 0.5-50 sec per section; other combinations are available. Ferrara, Inc.

53—STACKER also operates as a lift truck

This lightweight electro-hydraulic stacker with fifth-wheel steer can be used as a lift truck as well as for stacking. The truck is made in 1000-lb capacity in either platform or straddle types. With a lifting height of 58 in., stacker can lift a 1000 lb load at a speed of 25 fpm. It can handle pallets up to 48-by-48 in. When truck is being used as a stacker, handle locks in upright position; truck can be pushed, pulled or steered with handle in the vertical position to maneuver in extremely narrow aisles. When machine is used as a lift truck, handle is unlocked and used in normal pulling position. A built-in battery and charger supplies power for raising and lowering loads. The lift and lower control lever is conveniently located; stacker is equipped with hand-operated floor locks. According to company, this is an ideal unit for small plants and warehouses, and can be used to supplement heavier equipment in larger operations. Lewis-Shepard Products, Inc.

54—SPACE DEODORIZER controls outdoor odors

Aireactor, the space deodorizer which is used to control odors in hospitals, commercial buildings, railroads, is now announced for controlling outdoor odors. With it, rendering plants, brick kilns, fish canneries, sewage disposal plants and others with odor problems can continue functioning without danger of air-pollution of surrounding community, says manufacturer. The deodorant is described as a clear, non-flammable solution which, when vaporized, destroys odors but leaves no odor of its own. It is created from non-toxic elements in plant life, and obtains its results as masses of green foliage do in nature, company says. Deodorizing equipment is provided by the Aireactor Corp. in cooperation with the DeVilbiss Co., who have designed and manufactured equipment which regulates and diffuses Aireactor vapors. Aireactor Corp.

55—ABRASIVE WHEELS for the portable grinders

Simex Red Wheels have a construction feature said to impart extra strength and safety to high speed abrasive wheels—a safety web of spiral wound rayon auto tire cord. Wheels are lightweight, reinforced resinoid bonded abrasive types for use on portable disc and right angle

NoDrip® ...STOPS CONDENSATION DRIP

NoDRIP PREVENTS RUST —ANYONE CAN APPLY

NoDrip plastic coating is easily applied to tanks, containers, suction lines, vats, pipes, walls, ceilings, etc. NoDrip adheres to metal, concrete, brick, plaster. It forms a seamless 100% moisture-proof covering that is effective as soon as dry. Acid, alkali and brine resistant.

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FREE BULLETIN tells HOW to Solve high temperature THREAD PROBLEMS!

C-5 prevents Galling and Seizing of Studs at temps. up to 1800°F

- √ Prevents Stud Breakage
- √ Eliminates Pitting of Stainless Steel
- √ Reduces Torque
- √ Speeds Disassembly Time

C-5 FEL-PRO "HI-TEMP" ANTI-SEIZE THREAD COMPOUND

Fel-Pro's exclusive C-5 colloidal-copper formula "copper-plates" metal, prevents locking, galling and direct contact between thread assemblies even at 1800°F without breakdown! And C-5 is safe for all metals!

Prevents galvanic pitting even where dissimilar metals are joined! Protects all threaded surfaces of bolts, plugs and studs, insuring their repeated re-use. WRITE TODAY FOR FREE BULLETIN! 837-RR

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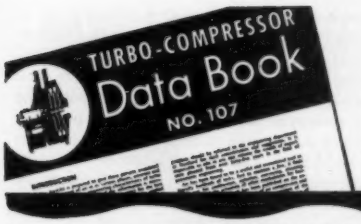

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Low Pressure Air

HAS 100 USES IN YOUR PLANT

4 oz. to 10 lbs.
35 to 20,000 c.f.m.

Spencer Turbos are used extensively for agitation, scale and liquid removal, cooling and drying. They have been a standard for heat treating for many years. These and many other uses are described in the Spencer Turbo Data Book. Ask for Bulletin No. 107-D.

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PREVENT SHUTDOWNS

REDUCE EQUIPMENT DAMAGE

LOCATE ELECTRICAL FAULT GROUNDS!

WITH

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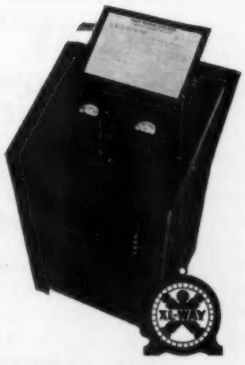
GROUND DETECTOR

Offering these ADVANTAGES:

- Locates fault grounds on isolated circuits (0-600 V. AC or DC—0-4160 AC) without shutdowns!
- Locates fault grounds in lead covered underground cables!
- Traces hidden pipes and cables!
- Imposes no additional stress voltages on conductors. (Uses line voltage and frequency for signal current)
- Signal is not lost as a result of high frequency impedances.
- NO EARPHONES — Eliminates noise and harmonic tone interference.
- Visually indicated Signal adjustable for efficient Fault location.
- Portable or Permanent.
- ONE MAN OPERATION!



HUNDREDS IN USE THROUGHOUT THE WORLD
Representatives in Principal Localities
WRITE FOR FULL DETAILS

EXCEL ELECTRIC SERVICE COMPANY
(Incorporated)
2126 So. Western Avenue • Chicago 8, Illinois

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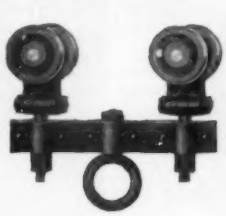
COBURN

OVERHEAD CONVEYING EQUIPMENT

means easy installation



The convenience and low cost of a Coburn Overhead Monorail installation make it the answer to your need for dependable materials handling equipment.

Here's why Coburn equipment is easy to install:

1. **Coburn engineers make a thorough study of your plant layout.**
2. **We submit easy-to-follow plans to you.**
3. **Your own plant personnel can install the simply designed equipment. Layout of the equipment can be changed readily because of sectional design.**

Write for Catalog #220 which contains full details on Coburn Monorail equipment and accessories to Coburn Sales and Engineering, 56 Sterling Street, Clinton, Mass.

2684

COBURN PRODUCTS
PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION
CF&I

For more facts circle 657 on Reply Card

NEW PRODUCTS

(Begins on page 134)

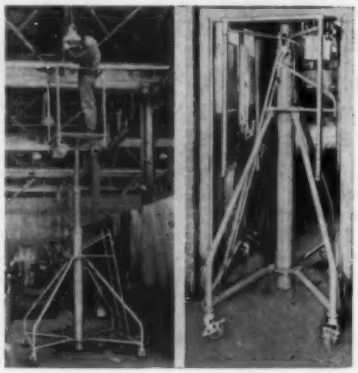
type portable grinders. They are made in depressed center or raised hub shape in 7 and 9 in. diam by 3/16 and ¼ in. thicknesses. Their field of application is for rough production grinding, especially for grinding welds, removing flash and bead, cleaning ragged surfaces and edges, and for all types of stainless steel. Their fast abrasive cutting action permits heavy stock removal, company points out, and their durable construction gives long wheel life.

Wheel is made like a conventional grinding wheel—from a wheel mix consisting of abrasive cutting particles and synthetic resin bonding agents, reinforced with alpha cellulose fibers criss-crossed and knitted together. There is a knurled or file-type pattern on grinding or cutting side of wheels. Grinding is done with the leading edge of wheel at about a 30 deg angle from work—actually cutting away excess metal. Finishing or cleaning is done with grinding wheel at about a 15 deg angle with work. Catalog Form ESA-244 gives more details on this. Simonds Abrasive Co.

56—TOWER lets a man work at 23-ft heights

Powered by a ¾ hp single phase electric motor, the ML-4-AC Moto-Lift work tower can be plugged into any 110-v a-c outlet. Motor operates a hydraulic pump to raise work platform from 7 to 17 ft above floor in 25 sec. Working capacity is 400 lb. Plug-in tower is being offered in addition to battery and hand operated models. Battery operated ML-3-DC Moto-Lift is powered by standard 12-v automotive storage battery, and has an improved hydraulic cylinder and high pressure flexible hose. Plug-in tower has 50 ft of heavy duty extension cable, permitting work along a 100 ft strip—before moving to another outlet.

Pressing a foot button controls elevation of both plug-in and battery operated towers. Hand operated model is raised by reciprocating a hand lever on hydraulic pump. All models are lowered by stepping on a hydraulic release valve. Swivelling casters permit towers to follow progressive work or get into and away from maintenance jobs quickly. The four-legged 61 by 61 in. base provides rigid and stable support, it is noted, yet the tower can be telescoped to pass through door as small as 7 ft high by 30 in. wide. Safway Steel Products, Inc.



57—CORNER PADS protect sheet metal surfaces

By-Buk Corner Pads are inexpensive pressure-sensitive cushions designed to prevent costly scratching and gouging of finished surfaces during shop handling of sheet metal. Manufacturer claims that at a total cost of less than 1½ cents all four corners of metal sheets are eliminated as potential instruments of damage to finished surfaces. Pads are designed for ready application to each corner of metal sheets at time they are removed from crate or bundle, and to newly formed corners.

The pads are made of treated paper stock having high resistance to piercing. High-tack pressure-sensitive adhesive holds them in position during handling operations. Available in two sizes—both provide the same amount of pad protection at corners. The larger size pad has more adhesive contact area and will therefore withstand greater forces which might cause accidental displacement during fabrication. Pads are supplied in rack size rolls, partially scored for easy separation into swatches. By-Buk Co.

Detects vibration!

MB Probe-type Vibration Pickup
offers new tool for maintenance and inspection

With this new MB Type 115 Pickup you can explore frames, bearings, housings . . . *without damping even the faintest vibration.* It lets you pin point the source of such disturbances; tells you when preventive maintenance is needed.

It can also be used for quick, quality-control checkups on the production line . . . lets you know whether products operate within acceptable limits of vibration, and locates vibratory noise sources.

This pickup works electromagnetically. It transforms vibration into voltage. An MB vibration meter is used to give you direct readings of the vibration. Send for more details.

MB MANUFACTURING COMPANY
A division of Textron American, Inc.
1063 State Street, New Haven 11, Conn.

For more facts circle 658 on Reply Card

FOR { DUST & FUME CONTROL
AIRCONDITIONING
MATERIALS HANDLING

FLEXAUST®

spiral wire reinforced

HOSE

LIGHT • STRONG
VERY FLEXIBLE

Flexaust hoses are made of strong cotton or nylon fabrics, neoprene coated. For *pressure* and *suction* uses, put it anywhere, bend it anywhere, move it anywhere. Flexaust hose will move air, fumes, dust, process waste or materials economically and efficiently.

SIZES 1¼" to 36" I.d.

EXTREMELY EASY TO INSTALL
DURABLE IN SERVICE

Also available — Portovent Duct — retractable type

Distributors in all principal cities

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Dept. PE-12 • 100 Park Avenue • New York 17, N. Y.

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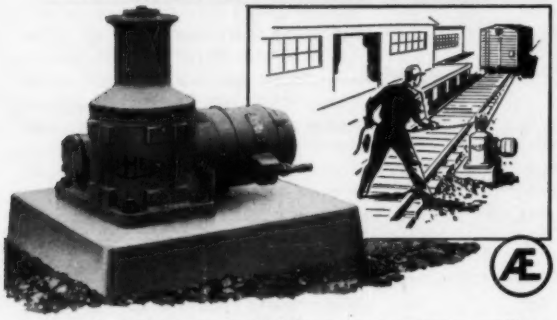
NOW! STOP WASTEFUL EXPENSE AT YOUR RAILROAD SIDING



IF YOU actually saw a Lo-Hed Car puller in operation you'd probably order one in a hurry. It is a first rate investment — pays for itself fast. It puts a stop to shifting charges. Cars get loaded and unloaded in record time. Demurrage charges are slashed. Industrial accidents are minimized... And a Lo-Hed Car Puller saves money *inside* a plant, too — pulls loads in a straight line, up grades and around corners.

Lo-Hed Car Puller is rugged, electrically-driven, built for trouble-free service. Write for folder telling you how to use a Car Puller in your plant.

AMERICAN ENGINEERING COMPANY

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AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Marine Deck Auxiliaries, Hydramite and Hele-Shaw Fluid Power, Lo-Hed Hoists, Car Pullers.

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PIONEERS IN ENGINEERING, MANUFACTURING & INSTALLING OF

INDUSTRIAL OVENS
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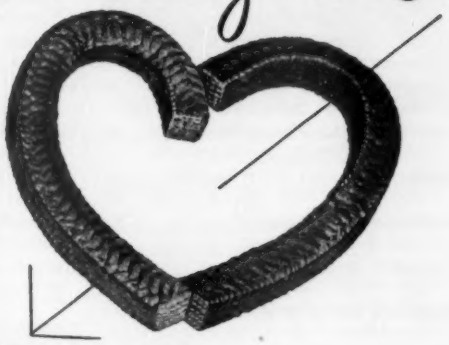
A honey of a packing with a strong heart!

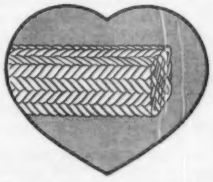


NEW Palmetto. "INTERWOVEN" SELF-LUBRICATING PACKINGS

For the highest speed centrifugal pumps—or any other application where pliability and high wear resistance is required . . . PALMETTO'S latest packing development has all this plus those features that have made PALMETTO the leader in the quality packing field.

As in all PALMETTO Self-Lubricating Packings, each strand is saturated separately *before* braiding, thus assuring complete and uniform lubrication of the *whole* packing. A reservoir of lubricant is "braided in" to make perfect sealing and long service life a certainty.

INTERWOVEN FOR EXTRA STRENGTH



In conventional packing each strand is braided only with the other strands in its own jacket . . . The *extra* in Palmetto Interwoven is a special braiding process which passes each strand through the heart of the packing. Consider the strength and wear resistance this adds to the packing! With each strand locked in, abrasion from moving parts will not weaken the packing by wearing away its surface. Since each strand passes through the packing, and not just along its surface, the finished product is highly pliable—not straight-jacketed.

PALMETTO Packings

Bulletin IP-10 gives complete details . . . Write for it today!

packing more performance into every application

GREENE, TWEED & CO.
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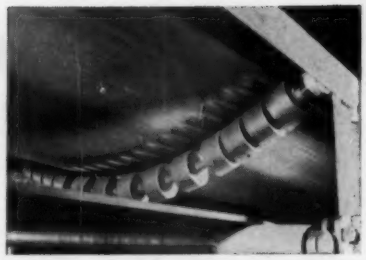


NEW CONVEYOR BELT IDLER

Handles sticky, abrasive, dusty, or corrosive materials.

Has only two bearings—up out of the dirt.

A 2-bearing, cable suspension idler that resists dust, abrasion, corrosion and material buildup is proving itself superior for bulk handling in many industries.

Called the Limberoller, it has already given *10 times* the service life of replaced steel idlers in handling abrasive foundry sands, coal, petroleum coke, potash, copper ores, copper mill tailings, iron ore, wet concrete, triple super phosphate, ammonium sulphate, and sticky fertilizers.

Pressure-molded neoprene or rubber discs on a flexible steel cable conform to load and cushion the belt, help keep belt aligned, and are self-cleaning. The two bearings are up out of the dirt zone; have had no design failures.

Unaffected by most corrosives that damage steel, the new idler is ideal for chemical, sulphur and salt plants; corrosive and high ozone atmospheres. It is more abrasive-resistant than steel and flexes out of the way of abrasive materials.

The Limberoller weighs 2/3 less than a conventional steel idler; is locked by a simple cotter key into special lightweight stands for easy installation and removal. No cover sheets are needed. Two types of stands are available: one that bolts to conventional rigid sections; and a self-supporting type that forms its own easily-erected, portable sections without bolts, by using special stiffening rails.

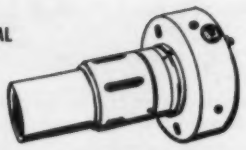
Because of these unique features, many companies have adopted Limberollers as standard for all belt conveyor operations. Details from *Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. Request Bulletin 24-15.*

For more facts circle 663 on Reply Card

BJ PUMPS DO A BETTER JOB!

Shown here are a few of Byron Jackson's complete line of centrifugal pumps and mechanical seals. For more information or special engineering assistance, contact your nearby BJ sales office or write Byron Jackson Pumps, P.O. Box 2017 Terminal Annex, Los Angeles 54, California.

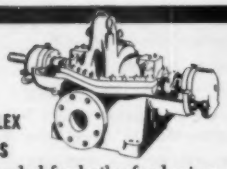
MECHANICAL SEALS



Replace standard packing in stuffingboxes. Eliminate excessive leakage and frequent repacking. Recommended for corrosive, high temperature or volatile liquid pumping. Prevent contamination of pumped liquid.

SUBMERSIBLE PUMPS

For well pumping, booster stations, or for standby service. Pump and sealed motor operate completely submerged. No pump house or surface structure needed. No well too deep. Ideal where flood menace exists. Capacities to 20,000 gpm and heads to 1800 ft. Write for Bulletins 55-2-700 and 55-3-700.

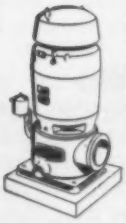


MULTIPLEX PUMPS

Recommended for boiler feed, pipeline, debarking and all classes of medium-to-high capacity, medium-to-high pressure and temperature service. Easy inspection or cleaning without disturbing piping, bearings or driver. Write for Bulletin 52-4000.

MOLTEN METAL PUMPS

These are special pumps for the efficient handling of liquid metals and molten chemicals at temperatures to 1500°F. Handle molten magnesium, sodium, lead, bismuth and other similar liquids.



DEEPWELL TURBINE PUMPS

Capacity and head combination from 3 bowl types and over 100 impeller designs. Choice of oil or water lubrication. Standard models for wells to 24" I.D. "Bee Jay" models for wells of 4", 5" and 6" I.D. Write for Bulletins 54-2-100 and 52-5150.

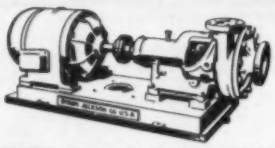


FIGURE 1025-1125 PROCESS PUMPS

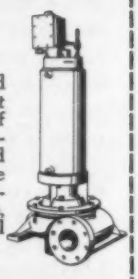
Moderately priced pumps for general-purpose handling. Available with BJ Mechanical Seal. Capacities to 2000 gpm, heads to 800 ft. Temperature limit 350°F. Write for Bulletin 353-300.

HYDROPRESS PUMPS

For medium to high pressure pumping at low capacity. Vertical construction saves space, simplifies installation. No relief valves required. Uniform non-pulsating flow. Capacities to 300 gpm. Heads to 7000 ft. Write for Bulletin 52-6400.

CANNED MOTOR PUMP

A hermetically-sealed pump and motor unit with zero leakage of pumped liquid to atmosphere. Motor, rotor and bearings operate in the pumped liquid. Primarily used for radioactive, toxic or other critical liquids.



MECHANICAL DRIVE SUBMERSIBLE MOTOR

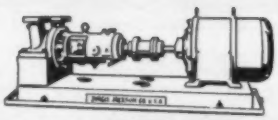
Mechanically-sealed, oil-filled motors in sizes from 7½ HP through 750 HP. From 2-pole operation to 10-pole. All operate on 60 cycle. Operate horizontally or vertically. Explosion-proof. Ideal for use as driver in applications where dust, fumes or flood-out may damage normal motors.

LIQUID OXYGEN PUMP

Specially designed to handle liquid oxygen or nitrogen at temperatures as low as −300°F. An insulated section between pump and stuffingbox keeps leakage to a minimum. Capacities to 300 gpm. Heads to 3000 ft.

SUMPMASTER PUMPS

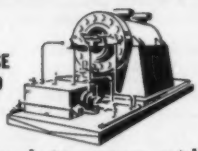
A complete line of standard vertical sump pumps in more than 3000 combinations. Also recommended for cooling, circulating and booster service. Self-priming. Capacities to 2600 gpm., heads to 300 ft. Write for Bulletin 54-3-1420.



2-STAGE SM PROCESS PUMPS

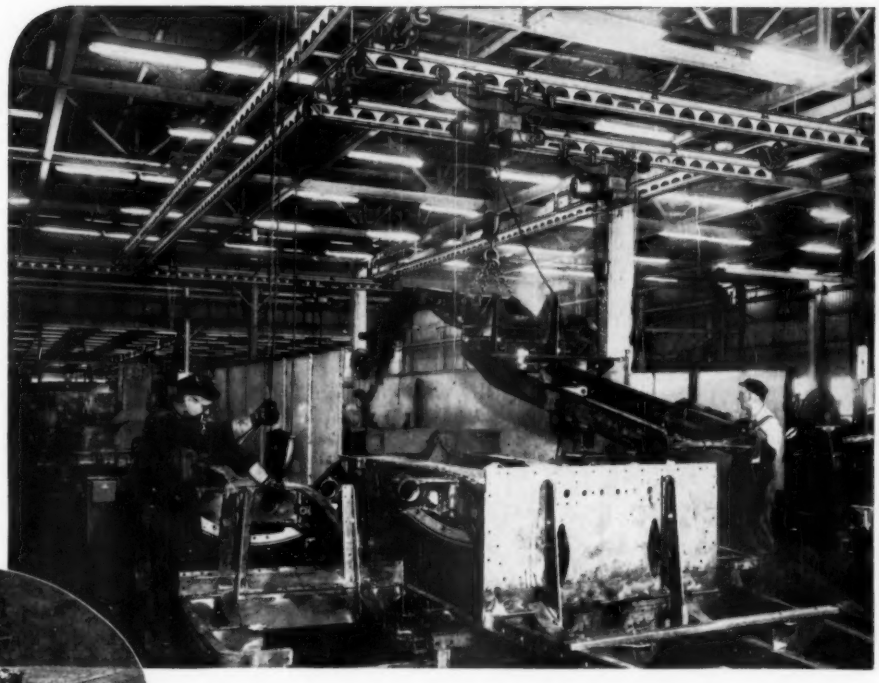
For pumping fluids over a wide range of pressures and for temperatures up to 800°F. Ideal for pumping hot or cold liquids near their boiling point. Capacities to 2200 gpm and heads to 1600 feet. Write for Bulletin 54-1-230.

DOUBLE CASE BOILER FEED PUMPS



Double-case design assures quick, uniform preheating, eliminates axial and radial thrusts. Horizontally-split inner volute case. Easily dismantled and reassembled. Capacities up to one million pounds per hour. Write for Bulletin 52-4500.

For more facts circle 664 on Reply Card



A hand-propelled interlocking crane system with two-ton electric hoists makes the handling of heavy parts easy in the Motor Grader Frame Assembly Section, Peoria, Illinois, Plant.

Caterpillar Diesel No. 12 Motor Grader in action.

EXTENSIVE TRAMRAIL INSTALLATIONS SERVE TWO GIANT CATERPILLAR TRACTOR CO. PLANTS

Peoria Plant Alone Has $1,000,000 Installation

SINCE the first small initial order for Cleveland Tramrail was placed by Caterpillar Tractor Co. over a quarter of a century ago, their installation has grown steadily until now in the vast Peoria Plant alone there is considerably more than one million dollars' worth in operation.

A large part of the job in building tractors, motor graders, diesel engines, etc., is handling materials. It is calculated that 20 tons of handling is required for each ton of tractors or diesel engines shipped from the plant. Saving a few minutes on each ton handled, amounts to a tremendous overall figure and resultant dollar savings.

Because of changes brought about by rapid plant growth, new models, or adoption of more advanced methods, for which Caterpillar is noted, it is often necessary to dismantle and re-erect Tramrail equipment. The ease with which this can be done with Cleveland Tramrail has proven to be especially advantageous to Caterpillar. Equipment serving one area can be taken down and installed in another area for use on an entirely different handling operation in very little time and usually without interfering with production.

Like Caterpillar, your plant, whether large or small, most likely can profit with Cleveland Tramrail.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7579 East 284 Street, Wickliffe, Ohio

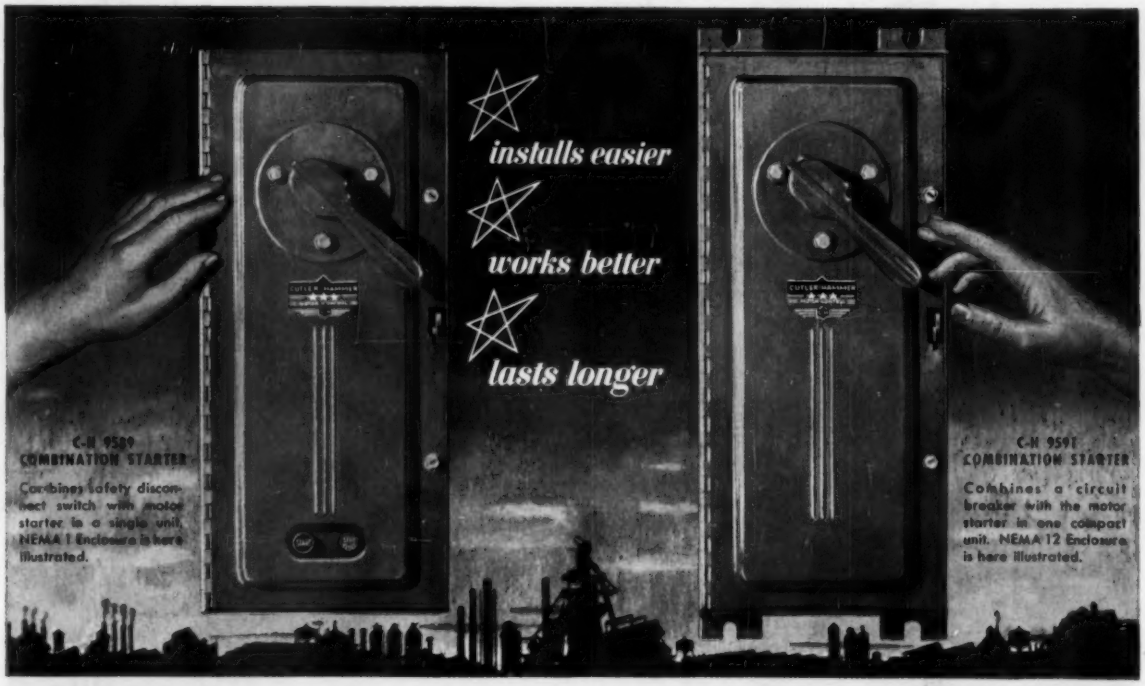
CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

For more facts circle 665 on Reply Card

WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

New Cutler-Hammer Three-Star Combination Starters offer industry important new economies


installs easier
works better
lasts longer
C-H 9589
COMBINATION STARTER
Combines safety disconnect switch with motor starter in a single unit. NEMA 1 Enclosure is here illustrated.
C-H 9591
COMBINATION STARTER
Combines a circuit breaker with the motor starter in one compact unit. NEMA 12 Enclosure is here illustrated.

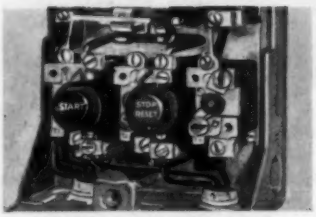
Convenience and economy are basic advantages of combination starters. Users everywhere say the new Cutler-Hammer ★ ★ ★ Combination Starters bring these basic advantages to new high levels of importance. Contact life is so amazingly improved that maintenance care is *never* needed in all normal uses. Adjustable load sensing coils permit motors to work at top capacity without hazard to provide maximum production without needless work interruptions. And the widely praised Cutler-Hammer exclusive, full three-phase overload protection in standard combination starters, is optional at slight additional cost.

The three silver stars stand for three new standards

CUTLER-HAMMER
★ ★ ★
MOTOR CONTROL
C-H

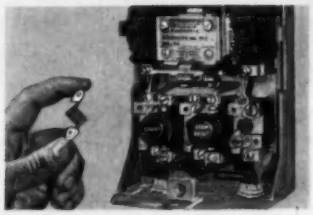
Compare the performance and economies of these remarkable new Cutler-Hammer Three-Star Combination Starters with any you have ever known. Cutler-Hammer Bulletin 9589 Combination Starters incorporate rugged disconnect switches of advanced design (fused or unfused). Cutler-Hammer Bulletin 9591 Combination Starters are equipped with circuit breakers. Your nearby Cutler-Hammer Authorized Distributor is stocked and ready to serve you. Order from him today.

CUTLER-HAMMER, Inc., 1447 St. Paul Avenue, Milwaukee 1, Wisconsin.



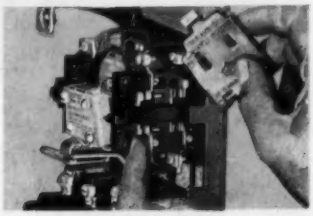
Full Three-Phase Protection

Only *three* overload relays can give complete three-phase protection to avoid motor burn-outs and their costly interruptions to production. And *only* Cutler-Hammer offers this complete three-phase protection in standard combination starters. You pay only for the third relay, nothing extra for special engineering or special enclosures.



Adjustable Load Sensing Coils

The accurate adjustment of overload protection permits motors to work harder without damage to motor windings. This is more important than ever with the newer type small frame motors. Adjustable load sensing coils in these new starters provide 3% loading accuracy instead of the 10% to 12% accuracy in competitive control.



Superlife Vertical Contacts

Experienced control users insist on dust-safe vertical contacts. And now the famous Cutler-Hammer vertical contacts have been doubly improved. First, their new lightweight design cuts bounce to reduce arcing. Second, any arcing that might occur is now pressure-quenched. Compare performance and see the difference.

For more facts circle 666 on Reply Card

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